

SEQUENCE LISTING

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<120> Polyketides and their synthesis

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<150> GB 9814006.4

<151> 1998-06-29

<160> 55

<170> PatentIn Ver. 2.1

<210> 1

<211> 398

<212> PRT

<213> Streptomyces sp. C5

<400> 1

Met Val Thr Gly Leu Gly Ile Val Ala Pro Asn Gly Leu Gly Val Gly

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15

Ala Ile Trp Asp Ala Val Leu Asn Gly Arg Asn Gly Ile Gly Pro Leu

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25

30

Arg Arg Phe Ala Asp Asp Gly Arg Leu Gly Arg Leu Ala Gly Glu Val

35

40

45

Ser Asp Phe Val Pro Glu Asp His Leu Pro Lys Arg Leu Leu Val Gln  
 50 55 60

Thr Asp Pro Met Thr Gln Met Thr Ala Leu Ala Ala Ala Glu Trp Ala  
 65 70 75 80

Leu Arg Glu Ala Gly Cys Ala Pro Ser Ser Pro Leu Glu Ala Gly Val  
 85 90 95

Ile Thr Ala Ser Ala Ser Gly Gly Phe Ala Ser Gly Gln Arg Glu Leu  
 100 105 110

Gln Asn Leu Trp Ser Lys Gly Pro Ala His Val Ser Ala Tyr Met Ser  
 115 120 125

Phe Ala Trp Phe Tyr Ala Val Asn Thr Gly Gln Ile Ala Ile Arg His  
 130 135 140

Asp Leu Arg Gly Pro Val Gly Val Val Val Ala Glu Gln Ala Gly Gly  
 145 150 155 160

Leu Asp Ala Leu Ala His Ala Arg Arg Lys Val Arg Gly Gly Ala Glu  
 165 170 175

Leu Ile Val Ser Gly Ala Met Asp Ser Ser Leu Cys Pro Tyr Gly Met  
 180 185 190

Ala Ala Gln Val Arg Ser Gly Arg Leu Ser Gly Ser Asp Asp Pro Thr  
 195 200 205

Ala Gly Tyr Leu Pro Phe Asp Arg Arg Ala Ala Gly His Val Pro Gly  
 210 215 220

Glu Gly Gly Ala Ile Leu Ala Val Glu Asp Ala Glu Arg Val Ala Glu  
 225 230 235 240

Arg Gly Gly Lys Val Tyr Gly Ser Ile Ala Gly Thr Ala Ser Phe Asp  
 245 250 255

Pro Pro Pro Gly Ser Gly Arg Pro Ser Ala Leu Ala Arg Ala Val Glu  
 260 265 270

Thr Ala Leu Ala Asp Ala Gly Leu Asp Arg Ser Asp Ile Ala Val Val  
 275 280 285

Phe Ala Asp Gly Ala Ala Val Gly Glu Leu Asp Val Ala Glu Ala Glu  
 290 295 300

Ala Leu Ala Ser Val Phe Gly Pro His Arg Val Pro Val Thr Val Pro  
 305 310 315 320

Lys Thr Leu Thr Gly Arg Leu Tyr Ser Gly Ala Gly Pro Leu Asp Val  
 325 330 335

Ala Thr Gly Leu Leu Ala Leu Arg Asp Glu Val Val Pro Ala Thr Gly  
 340 345 350

His Val His Pro Asp Pro Asp Leu Pro Leu Asp Val Val Thr Gly Arg  
 355 360 365

Pro Arg Ala Met Ala Asp Ala Arg Ala Ala Leu Val Val Ala Arg Gly  
 370 375 380

His Gly Gly Phe Asn Ser Ala Leu Val Val Arg Gly Ala Ala  
 385 390 395

<210> 2

<211> 425

<212> PRT

<213> Streptomyces peucetius

<400> 2

Met Thr Gly Thr Ala Ala Arg Thr Ala Ser Ser Gln Leu His Ala Ser  
 1 5 10 15

Pro Ala Gly Arg Arg Gly Leu Arg Gly Arg Ala Val Val Thr Gly Leu  
 20 25 30

Gly Ile Val Ala Pro Asn Gly Leu Gly Val Gly Ala Tyr Trp Asp Ala  
 35 40 45

Val Leu Asn Gly Arg Asn Gly Ile Gly Pro Leu Arg Arg Phe Thr Gly  
 50 55 60

Asp Gly Arg Leu Gly Arg Leu Ala Gly Glu Val Ser Asp Phe Val Pro  
 65 70 75 80

Glu Asp His Leu Pro Lys Arg Leu Leu Ala Gln Thr Asp Pro Met Thr  
 85 90 95

Gln Tyr Ala Leu Ala Ala Ala Glu Trp Ala Leu Arg Glu Ser Gly Cys  
 100 105 110

Ser Pro Ser Ser Pro Leu Glu Ala Gly Val Ile Thr Ala Ser Ala Ser  
 115 120 125

Gly Gly Phe Ala Phe Gly Gln Arg Glu Leu Gln Asn Leu Trp Ser Lys  
 130 135 140

Gly Pro Ala His Val Ser Ala Tyr Met Ser Phe Ala Trp Phe Tyr Ala  
 145 150 155 160

Val Asn Thr Gly Gln Ile Ala Ile Arg His Asp Leu Arg Gly Pro Val  
 165 170 175

Gly Val Val Val Ala Glu Gln Ala Gly Gly Leu Asp Ala Leu Ala His  
 180 185 190

Ala Arg Arg Lys Val Arg Gly Gly Ala Glu Leu Ile Val Ser Gly Ala  
 195 200 205

Val Asp Ser Ser Leu Cys Pro Tyr Gly Met Ala Ala Gln Val Lys Ser  
 210 215 220

Gly Arg Leu Ser Gly Ser Asp Asn Pro Thr Ala Gly Tyr Leu Pro Phe  
 225 230 235 240

Asp Arg Arg Ala Ala Gly His Val Pro Gly Glu Gly Gly Ala Ile Leu  
 245 250 255

Thr Val Glu Asp Ala Glu Arg Ala Ala Glu Arg Gly Ala Lys Val Tyr  
 260 265 270

Gly Ser Ile Ala Gly Tyr Gly Ala Ser Phe Asp Pro Pro Pro Gly Ser  
 275 280 285

Gly Arg Pro Ser Ala Leu Ala Arg Ala Val Glu Thr Ala Leu Ala Asp  
 290 295 300

Ala Gly Leu Asp Gly Ser Asp Ile Ala Val Val Phe Ala Asp Gly Ala  
 305 310 315 320

Ala Val Pro Glu Leu Asp Ala Ala Glu Ala Glu Ala Leu Ala Ser Val  
 325 330 335

Phe Gly Pro Arg Arg Val Pro Val Thr Val Pro Lys Thr Leu Thr Gly  
 340 345 350

Arg Leu Tyr Ser Gly Ala Gly Pro Leu Asp Val Ala Thr Ala Leu Leu  
 355 360 365

Ala Leu Arg Asp Glu Val Val Pro Ala Thr Ala His Val Asp Pro Asp  
 370 375 380

Pro Asp Leu Pro Leu Asp Val Val Thr Gly Arg Pro Arg Ser Leu Ala  
 385 390 395 400

Asp Ala Arg Ala Ala Leu Leu Val Ala Arg Gly Tyr Gly Gly Phe Asn  
 405 410 415

Ser Ala Leu Val Val Arg Gly Ala Ala  
 420 425

<210> 3

<211> 407

<212> PRT

<213> Streptomyces coelicolor

<400> 3

Met Ser Val Leu Ile Thr Gly Val Gly Val Val Ala Pro Asn Gly Leu  
1 5 10 15

Gly Leu Ala Pro Tyr Trp Ser Ala Val Leu Asp Gly Arg His Gly Leu  
20 25 30

Gly Pro Val Thr Arg Phe Asp Val Ser Arg Tyr Pro Ala Thr Leu Ala  
35 40 45

Gly Gln Ile Asp Asp Phe His Ala Pro Asp His Ile Pro Gly Arg Leu  
50 55 60

Leu Pro Gln Thr Asp Pro Ser Thr Arg Leu Ala Leu Thr Ala Ala Asp  
65 70 75 80

Trp Ala Leu Gln Asp Ala Lys Ala Asp Pro Glu Ser Leu Thr Asp Tyr  
85 90 95

Asp Met Gly Val Val Thr Ala Asn Ala Cys Gly Gly Phe Asp Phe Thr  
100 105 110

His Arg Glu Phe Arg Lys Leu Trp Ser Glu Gly Pro Lys Ser Val Ser  
115 120 125

Val Tyr Glu Ser Phe Ala Trp Phe Tyr Ala Val Asn Thr Gly Gln Ile  
130 135 140

Ser Ile Arg His Gly Met Arg Gly Pro Ser Ser Ala Leu Val Ala Glu  
145 150 155 160

Gln Ala Gly Gly Leu Asp Ala Leu Gly His Ala Arg Arg Thr Ile Arg  
 165 170 175

Arg Gly Thr Pro Leu Val Val Ser Gly Gly Val Asp Ser Ala Leu Asp  
 180 185 190

Pro Trp Gly Trp Val Ser Gln Ile Ala Ser Gly Arg Ile Ser Thr Ala  
 195 200 205

Thr Asp Pro Asp Arg Ala Tyr Leu Pro Phe Asp Glu Arg Ala Ala Gly  
 210 215 220

Tyr Val Pro Gly Glu Gly Gly Ala Ile Leu Val Leu Glu Asp Ser Ala  
 225 230 235 240

Ala Ala Glu Ala Arg Gly Arg His Asp Ala Tyr Gly Glu Leu Ala Gly  
 245 250 255

Cys Ala Ser Thr Phe Asp Pro Ala Pro Gly Ser Gly Arg Pro Ala Gly  
 260 265 270

Leu Glu Arg Ala Ile Arg Leu Ala Leu Asn Asp Ala Gly Thr Gly Pro  
 275 280 285

Glu Asp Val Asp Val Val Phe Ala Asp Gly Ala Gly Val Pro Glu Leu  
 290 295 300

Asp Ala Ala Glu Ala Arg Ala Ile Gly Arg Val Phe Gly Arg Glu Gly  
 305 310 315 320

Val Pro Val Thr Val Pro Lys Thr Thr Thr Gly Arg Leu Tyr Ser Gly  
 325 330 335

Gly Gly Pro Leu Asp Val Val Thr Ala Leu Met Ser Leu Arg Glu Gly  
 340 345 350

Val Ile Ala Pro Thr Ala Gly Val Thr Ser Val Pro Arg Glu Tyr Gly  
 355 360 365

Ile Asp Leu Val Leu Gly Glu Pro Arg Ser Thr Ala Pro Arg Thr Ala  
 370 375 380

Leu Val Leu Ala Arg Gly Arg Trp Gly Phe Asn Ser Ala Ala Val Leu  
 385 390 395 400

Arg Arg Phe Ala Pro Thr Pro  
 405

<210> 4

<211> 403

<212> PRT

<213> Saccharopolyspora hirsuta

<400> 4

Met Ser Thr Trp Val Thr Gly Met Gly Val Val Ala Pro Asn Gly Leu  
 1 5 10 15

Gly Ala Asp Asp His Trp Ala Ala Thr Leu Lys Gly Arg His Gly Ile  
 20 25 30

Ser Arg Leu Ser Arg Phe Asp Pro Thr Gly Tyr Pro Ala Glu Leu Ala  
 35 40 45

Gly Gln Val Leu Asp Phe Asp Ala Thr Glu His Leu Pro Lys Arg Leu  
 50 55 60

Leu Pro Gln Thr Asp Val Ser Thr Arg Phe Ala Leu Ala Ala Ala Ala  
 65 70 75 80

Trp Ala Leu Ala Asp Ala Glu Val Asp Pro Ala Glu Leu Pro Glu Tyr  
 85 90 95

Gly Thr Gly Val Ile Thr Ser Asn Ala Thr Gly Gly Phe Glu Phe Thr  
 100 105 110



His Arg Glu Phe Arg Lys Leu Trp Ala Gln Gly Pro Glu Phe Val Ser  
 115 120 125

Val Tyr Glu Ser Phe Ala Trp Phe Tyr Ala Val Asn Thr Gly Gln Ile  
 130 135 140

Ser Ile Arg His Gly Leu Arg Gly Pro Gly Ser Val Leu Val Ala Glu  
 145 150 155 160

Gln Ala Gly Gly Leu Asp Ala Val Gly His Gly Gly Ala Val Arg Asn  
 165 170 175

Gly Thr Pro Met Val Val Thr Gly Gly Val Asp Ser Ser Phe Asp Pro  
 180 185 190

Trp Gly Trp Val Ser His Val Ser Ser Gly Arg Val Ser Arg Ala Thr  
 195 200 205

Asp Pro Gly Arg Ala Tyr Leu Pro Phe Asp Val Ala Ala Asn Gly Tyr  
 210 215 220

Val Pro Gly Glu Gly Gly Ala Ile Leu Leu Leu Glu Asp Ala Glu Ser  
 225 230 235 240

Ala Lys Ala Arg Gly Ala Thr Gly Tyr Gly Glu Ile Ala Gly Tyr Ala  
 245 250 255

Ala Thr Phe Asp Pro Ala Pro Gly Ser Glu Arg Pro Pro Ala Leu Arg  
 260 265 270

Arg Ala Ile Glu Leu Ala Leu Ala Asp Ala Glu Leu Arg Pro Glu Gln  
 275 280 285

Val Asp Val Val Phe Ala Asp Ala Ala Gly Val Ala Glu Leu Asp Ala  
 290 295 300

Ile Glu Ala Ala Ala Ile Arg Glu Leu Phe Gly Pro Ser Gly Val Pro  
 305 310 315 320

10

Val Thr Ala Pro Lys Thr Met Thr Gly Arg Leu Tyr Ser Gly Gly Gly  
325 330 335

Pro Leu Asp Leu Val Ala Ala Leu Leu Ala Ile Arg Asp Gly Val Ile  
340 345 350

Pro Pro Thr Val His Thr Ala Glu Pro Val Pro Glu His Gln Leu Asp  
355 360 365

Leu Val Thr Gly Asp Pro Arg His Gln Gln Leu Gly Thr Ala Leu Val  
370 375 380

Leu Ala Arg Gly Lys Trp Gly Phe Asn Ser Ala Val Val Val Arg Gly  
385 390 395 400

Val Thr Gly

<210> 5

<211> 415

<212> PRT

<213> Streptomyces violaceoruber

<400> 5

Met Ser Thr Pro Asp Arg Arg Arg Ala Val Val Thr Gly Leu Ser Val  
1 5 10 15

Ala Ala Pro Gly Gly Leu Gly Thr Glu Arg Tyr Trp Lys Ser Leu Leu  
20 25 30

Thr Gly Glu Asn Gly Ile Ala Glu Leu Ser Arg Phe Asp Ala Ser Arg  
35 40 45

Tyr Pro Ser Arg Leu Ala Gly Gln Ile Asp Asp Phe Glu Ala Ser Glu  
50 55 60

His Leu Pro Ser Arg Leu Leu Pro Gln Thr Asp Val Ser Thr Arg Tyr  
 65 70 75 80

Ala Leu Ala Ala Ala Asp Trp Ala Leu Ala Asp Ala Gly Val Gly Pro  
 85 90 95

Glu Ser Gly Leu Asp Asp Tyr Asp Leu Gly Val Val Thr Ser Thr Ala  
 100 105 110

Gln Gly Gly Phe Asp Phe Thr His Arg Glu Phe His Lys Leu Trp Ser  
 115 120 125

Gln Gly Pro Ala Tyr Val Ser Val Tyr Glu Ser Phe Ala Trp Phe Tyr  
 130 135 140

Ala Val Asn Thr Gly Gln Ile Ser Ile Arg Asn Thr Met Arg Gly Pro  
 145 150 155 160

Ser Ala Ala Leu Val Gly Glu Gln Ala Gly Gly Leu Asp Ala Ile Gly  
 165 170 175

His Ala Arg Arg Thr Val Arg Arg Gly Pro Gly Trp Cys Ser Ala Val  
 180 185 190

Ala Ser Thr Arg Arg Ser Thr Arg Gly Ala Ser Ser Ser Gln Leu Ser  
 195 200 205

Gly Gly Leu Val Ser Thr Val Ala Asp Pro Glu Arg Ala Tyr Leu Pro  
 210 215 220

Phe Asp Val Asp Ala Ser Gly Tyr Val Pro Gly Glu Gly Gly Ala Val  
 225 230 235 240

Leu Ile Val Glu Asp Ala Asp Ser Ala Arg Ala Arg Gly Ala Glu Arg  
 245 250 255

Ile Tyr Val Arg Ser Pro Leu Arg Arg Asp Pro Ala Pro Gly Ser Gly  
 260 265 270

Arg Pro Pro Ala Leu Gly Arg Ala Ala Glu Leu Ala Leu Ala Glu Ala  
 275 280 285

Gly Leu Thr Pro Ala Asp Ile Ser Val Val Phe Ala Asp Gly Ala Gly  
 290 295 300

Val Pro Glu Leu Asp Arg Ala Glu Ala Asp Thr Leu Ala Arg Leu Phe  
 305 310 315 320

Gly Pro Arg Gly Val Pro Val Thr Ala Pro Lys Ala Leu Thr Gly Arg  
 325 330 335

Leu Cys Ala Gly Gly Gly Pro Ala Asp Leu Ala Ala Ala Leu Leu Ala  
 340 345 350

Leu Arg Asp Gln Val Ile Pro Ala Thr Gly Arg His Arg Ala Val Pro  
 355 360 365

Asp Ala Tyr Ala Leu Asp Leu Val Thr Gly Arg Pro Arg Glu Ala Ala  
 370 375 380

Leu Ser Ala Ala Leu Val Leu Ala Arg Gly Arg His Gly Phe Asn Ser  
 385 390 395 400

Ala Val Val Val Thr Leu Arg Gly Ser Asp His Arg Arg Pro Thr  
 405 410 415

<210> 6

<211> 409

<212> PRT

<213> Streptomyces nogalater

<400> 6

Met Thr Ala Ala Val Val Val Thr Gly Leu Gly Val Val Ala Pro Thr  
 1 5 10 15

Gly Leu Gly Val Arg Glu His Trp Ser Ser Thr Val Arg Gly Ala Ser  
 20 25 30

Ala Ile Gly Pro Val Thr Arg Phe Asp Ala Gly Arg Tyr Pro Ser Lys  
 35 40 45

Leu Ala Gly Glu Val Pro Gly Phe Val Pro Glu Asp His Leu Pro Ser  
 50 55 60

Arg Leu Met Pro Gln Thr Asp His Met Thr Arg Leu Ala Leu Val Ala  
 65 70 75 80

Ala Asp Trp Ala Phe Gln Asp Ala Ala Val Asp Pro Ser Lys Leu Pro  
 85 90 95

Glu Tyr Gly Val Gly Val Val Thr Ala Ser Ser Ala Gly Gly Phe Glu  
 100 105 110

Phe Gly His Arg Glu Leu Gln Asn Leu Trp Ser Leu Gly Pro Gln Tyr  
 115 120 125

Val Ser Ala Tyr Gln Ser Phe Ala Trp Phe Tyr Ala Val Asn Thr Gly  
 130 135 140

Gln Val Ser Ile Arg His Gly Leu Arg Gly Pro Gly Gly Val Leu Val  
 145 150 155 160

Thr Glu Gln Ala Gly Gly Leu Asp Ala Leu Gly Gln Ala Arg Arg Gln  
 165 170 175

Leu Arg Arg Gly Leu Pro Met Val Val Ala Gly Ala Val Asp Gly Ser  
 180 185 190

Pro Cys Pro Trp Gly Trp Val Ala Gln Leu Ser Ser Gly Gly Leu Ser  
 195 200 205

Thr Ser Asp Asp Pro Arg Arg Ala Tyr Leu Pro Phe Asp Ala Ala Ala  
 210 215 220



&lt;210&gt; 7

&lt;211&gt; 409

&lt;212&gt; PRT

<213> *Streptomyces glaucescens*

&lt;400&gt; 7

Met Ser Ala Pro Ala Pro Val Val Val Thr Gly Leu Gly Ile Val Ala

1 5 10 15

Pro Asn Gly Thr Gly Thr Glu Glu Tyr Trp Ala Ala Thr Leu Ala Gly

20 25 30

Lys Ser Gly Ile Asp Val Ile Gln Arg Phe Asp Pro His Gly Tyr Pro

35 40 45

Val Arg Val Gly Gly Glu Val Leu Ala Phe Asp Ala Ala Ala His Leu

50 55 60

Pro Gly Arg Leu Leu Pro Gln Thr Asp Arg Met Thr Gln His Ala Leu

65 70 75 80

Val Ala Ala Glu Trp Ala Leu Ala Asp Ala Gly Leu Glu Pro Glu Lys

85 90 95

Gln Asp Glu Tyr Gly Leu Gly Val Leu Thr Ala Ala Gly Ala Gly Gly

100 105 110

Phe Glu Phe Gly Gln Arg Glu Met Gln Lys Leu Trp Gly Thr Gly Pro

115 120 125

Glu Arg Val Ser Ala Tyr Gln Ser Phe Ala Trp Phe Tyr Ala Val Asn

130 135 140

Thr Gly Gln Ile Ser Ile Arg His Gly Met Arg Gly His Ser Ser Val

145 150 155 160

Phe Val Thr Glu Gln Ala Gly Gly Leu Asp Ala Ala Ala His Ala Ala

165 170 175

Arg Leu Leu Arg Lys Gly Thr Leu Asn Thr Ala Leu Thr Gly Gly Cys  
 180 185 190

Glu Ala Ser Leu Cys Pro Trp Gly Leu Val Ala Gln Ile Pro Ser Gly  
 195 200 205

Phe Leu Ser Glu Ala Thr Asp Pro His Asp Ala Tyr Leu Pro Phe Asp  
 210 215 220

Ala Arg Ala Ala Gly Tyr Val Pro Gly Glu Gly Gly Ala Met Leu Val  
 225 230 235 240

Ala Glu Arg Ala Asp Ser Ala Arg Glu Arg Asp Ala Ala Thr Val Tyr  
 245 250 255

Gly Arg Ile Ala Gly His Ala Ser Thr Phe Asp Ala Arg Pro Gly Thr  
 260 265 270

Gly Arg Pro Thr Gly Pro Ala Arg Ala Ile Arg Leu Ala Leu Glu Glu  
 275 280 285

Ala Arg Val Ala Pro Glu Asp Val Asp Val Val Tyr Ala Asp Ala Ala  
 290 295 300

Gly Val Pro Ala Leu Asp Arg Ala Glu Ala Glu Ala Leu Ala Glu Val  
 305 310 315 320

Phe Gly Pro Gly Ala Val Pro Val Thr Ala Pro Lys Thr Met Thr Gly  
 325 330 335

Arg Leu Tyr Ala Gly Gly Ala Ala Leu Asp Val Ala Thr Ala Leu Leu  
 340 345 350

Ser Ile Arg Asp Cys Val Val Pro Pro Thr Val Gly Thr Gly Ala Pro  
 355 360 365

Ala Pro Gly Leu Gly Ile Asp Leu Val Leu His Gln Pro Arg Glu Leu  
 370 375 380



Arg Val Asp Thr Ala Leu Val Val Ala Arg Gly Met Gly Gly Phe Asn  
 385 390 395 400

Ser Ala Leu Val Val Arg Arg His Gly  
 405

<210> 8

<211> 402

<212> PRT

<213> Streptomyces cinnamomensis

<400> 8

Met Thr Pro Val Ala Val Thr Gly Met Gly Ile Ala Ala Pro Asn Gly  
 1 5 10 15

Leu Gly Arg Pro Thr Thr Gly Arg Pro Pro Trp Ala Pro Arg Ala Ala  
 20 25 30

Ser Ala Ala Ser Thr Arg Phe Asp Pro Ser Gly Tyr Pro Ala Gln Leu  
 35 40 45

Ala Gly Glu Ile Pro Gly Phe Arg Ala Ala Glu His Leu Pro Gly Arg  
 50 55 60

Leu Val Pro Gln Thr Asp Arg Val Thr Arg Leu Ser Leu Ala Ala Ala  
 65 70 75 80

Asp Trp Ala Leu Ala Asp Ala Gly Val Glu Val Ala Ala Phe Asp Pro  
 85 90 95

Leu Asp Met Gly Val Val Thr Ala Ser His Ala Gly Gly Phe Glu Phe  
 100 105 110

Gly Gln Asp Glu Leu Gln Lys Leu Leu Gly Gln Gly Gln Pro Val Leu  
 115 120 125

Ser Ala Tyr Gln Ser Phe Ala Trp Phe Tyr Ala Val Asn Ser Gly Gln  
 130 135 140

Ile Ser Ile Arg His Gly Met Lys Gly Pro Ser Gly Val Val Val Ser  
 145 150 155 160

Asp Gln Ala Gly Gly Leu Asp Ala Leu Ala Gln Ala Arg Arg Leu Val  
 165 170 175

Arg Lys Gly Thr Pro Leu Ile Val Cys Gly Ala Val Glu Pro Arg Ser  
 180 185 190

Ala Pro Gly Ala Gly Ser Pro Ser Ser Pro Ala Gly Gly Met Ser Asp  
 195 200 205

Ser Asp Glu Pro Asn Arg Ala Tyr Leu Pro Phe Asp Arg Asp Gly Arg  
 210 215 220

Gly Tyr Val Pro Gly Gly Gly Arg Gly Val Val Pro Pro Leu Glu Arg  
 225 230 235 240

Ala Glu Ala Ala Pro Ala Arg Gly Ala Glu Val Tyr Gly Glu Ala Gly  
 245 250 255

Pro Leu Ala Arg Leu Pro Ala Pro His Ser Gly Arg Gly Ser Thr Arg  
 260 265 270

Ala His Ala Ile Arg Thr Ala Leu Asp Asp Ala Gly Thr Ala Pro Gly  
 275 280 285

Asp Ile Arg Arg Val Phe Ala Asp Gly Gly Gly Arg Tyr Pro Asn Asp  
 290 295 300

Arg Ala Glu Ala Glu Ala Ile Ser Glu Val Phe Gly Pro Gly Arg Val  
 305 310 315 320

Pro Val Thr Cys Pro Arg Thr Met Thr Gly Arg Leu His Ser Gly Ala  
 325 330 335

Ala Pro Leu Asp Val Ala Cys Ala Leu Leu Ala Met Arg Ala Gly Val  
 340 345 350

Ile Pro Pro Thr Val His Ile Asp Pro Cys Pro Glu Tyr Asp Leu Asp  
 355 360 365

Leu Val Leu Tyr Gln Val Arg Pro Ala Ala Leu Arg Thr Ala Leu Gly  
 370 375 380

Gly Ala Arg Gly His Gly Gly Phe Asn Ser Ala Leu Val Val Arg Ala  
 385 390 395 400

Gly Gln

<210> 9

<211> 404

<212> PRT

<213> Streptomyces venezuelae

<400> 9

Met Ser Ala Ser Val Val Val Thr Gly Leu Gly Val Ala Ala Pro Asn  
 1 5 10 15

Gly Leu Gly Arg Glu Asp Phe Trp Ala Ser Thr Leu Gly Gly Lys Ser  
 20 25 30

Gly Ile Gly Pro Leu Thr Arg Phe Asp Pro Thr Gly Tyr Pro Ala Arg  
 35 40 45

Leu Ala Gly Glu Val Pro Gly Phe Ala Ala Glu Glu His Leu Pro Ser  
 50 55 60

Arg Leu Leu Pro Gln Thr Asp Arg Met Thr Arg Leu Ala Leu Val Ala  
 65 70 75 80



Pro Gly Asp Ile Asp Val Val Phe Ala Asp Ala Ala Ala Val Pro Glu  
 290 295 300

Leu Asp Arg Val Glu Ala Glu Ala Leu Asn Ala Val Phe Gly Thr Gly  
 305 310 315 320

Ala Val Pro Val Thr Ala Pro Lys Thr Met Thr Gly Arg Leu Tyr Ser  
 325 330 335

Gly Ala Ala Pro Leu Asp Leu Ala Ala Ala Phe Leu Ala Met Asp Glu  
 340 345 350

Gly Val Ile Pro Pro Thr Val Asn Val Glu Pro Asp Ala Ala Tyr Gly  
 355 360 365

Leu Asp Leu Val Val Gly Gly Pro Arg Thr Ala Glu Val Asn Thr Ala  
 370 375 380

Leu Val Ile Ala Arg Gly His Gly Gly Phe Asn Ser Ala Met Val Val  
 385 390 395 400

Arg Ser Ala Asn

<210> 10

<211> 424

<212> PRT

<213> Streptomyces coelicolor

<400> 10

Met Ser Gly Pro Gln Arg Thr Gly Thr Gly Gly Gly Ser Arg Arg Ala  
 1 5 10 15

Val Val Thr Gly Leu Gly Val Leu Ser Pro His Gly Thr Gly Val Glu  
 20 25 30

Ala His Trp Lys Ala Val Ala Asp Gly Thr Ser Ser Leu Gly Pro Val  
 35 40 45

Thr Arg Glu Gly Cys Ala His Leu Pro Leu Arg Val Ala Gly Glu Val  
 50 55 60

His Gly Phe Asp Ala Ala Glu Thr Val Glu Asp Arg Phe Leu Val Gln  
 65 70 75 80

Thr Asp Arg Phe Thr His Phe Ala Leu Ser Ala Thr Gln His Ala Leu  
 85 90 95

Ala Asp Ala Arg Phe Gly Arg Ala Asp Val Asp Ser Pro Tyr Ser Val  
 100 105 110

Gly Val Val Thr Ala Ala Gly Ser Gly Gly Gly Glu Phe Gly Gln Arg  
 115 120 125

Glu Leu Gln Asn Leu Trp Gly His Gly Ser Arg His Val Gly Pro Tyr  
 130 135 140

Gln Ser Ile Ala Trp Phe Tyr Ala Ala Ser Thr Gly Gln Val Ser Ile  
 145 150 155 160

Arg Asn Asp Phe Lys Gly Pro Cys Gly Val Val Ala Ala Asp Glu Ala  
 165 170 175

Gly Gly Leu Asp Ala Leu Ala His Ala Ala Leu Ala Val Arg Asn Gly  
 180 185 190

Thr Asp Thr Val Val Cys Gly Ala Thr Glu Ala Pro Leu Ala Pro Tyr  
 195 200 205

Ser Ile Val Cys Gln Leu Gly Tyr Pro Glu Leu Ser Arg Ala Thr Glu  
 210 215 220

Pro Asp Arg Ala Tyr Arg Pro Phe Thr Glu Ala Ala Cys Gly Phe Ala  
 225 230 235 240

Pro Ala Glu Gly Gly Ala Val Leu Val Val Glu Glu Glu Ala Ala Ala  
 245 250 255

Arg Glu Arg Gly Ala Asp Val Arg Ala Thr Val Ala Gly His Ala Ala  
 260 265 270

Thr Phe Thr Gly Ala Gly Arg Trp Ala Glu Ser Arg Glu Gly Leu Ala  
 275 280 285

Arg Ala Ile Gln Gly Ala Leu Ala Glu Ala Gly Cys Arg Pro Glu Glu  
 290 295 300

Val Asp Val Val Phe Ala Asp Ala Leu Gly Val Pro Glu Ala Asp Arg  
 305 310 315 320

Ala Glu Ala Leu Ala Leu Ala Asp Ala Leu Gly Pro His Ala Ala Arg  
 325 330 335

Val Pro Val Thr Ala Pro Lys Thr Gly Thr Gly Arg Ala Tyr Cys Ala  
 340 345 350

Ala Pro Val Leu Asp Val Ala Thr Ala Val Leu Ala Met Glu His Gly  
 355 360 365

Leu Ile Pro Pro Thr Pro His Val Leu Asp Val Cys His Asp Leu Asp  
 370 375 380

Leu Val Thr Gly Arg Ala Arg Pro Ala Glu Pro Arg Thr Ala Leu Val  
 385 390 395 400

Leu Ala Arg Gly Leu Met Gly Ser Asn Ser Ala Leu Val Leu Arg Arg  
 405 410 415

Gly Ala Val Pro Pro Glu Gly Arg  
 420

&lt;210&gt; 11

&lt;211&gt; 421

&lt;212&gt; PRT

&lt;213&gt; Streptomyces violaceoruber

&lt;400&gt; 11

Met Thr Arg Arg Val Val Ile Thr Gly Val Gly Val Arg Ala Pro Gly  
 1 5 10 15

Gly Ser Gly Thr Lys Glu Phe Trp Asp Leu Leu Thr Ala Gly Arg Thr  
 20 25 30

Ala Thr Arg Pro Ile Ser Phe Phe Asp Ala Ser Pro Phe Arg Ser Arg  
 35 40 45

Ile Ala Gly Glu Ile Asp Phe Asp Ala Val Ala Glu Gly Phe Ser Pro  
 50 55 60

Arg Glu Val Arg Arg Met Asp Arg Ala Thr Gln Phe Ala Val Ala Cys  
 65 70 75 80

Thr Arg Asp Ala Leu Ala Asp Ser Gly Leu Asp Thr Gly Ala Leu Asp  
 85 90 95

Pro Ser Arg Ile Gly Val Ala Leu Gly Ser Ala Val Ala Ser Ala Thr  
 100 105 110

Ser Leu Glu Asn Glu Tyr Leu Val Met Ser Asp Ser Gly Arg Glu Trp  
 115 120 125

Leu Val Asp Pro Ala His Leu Ser Pro Met Met Phe Asp Tyr Leu Ser  
 130 135 140

Pro Gly Val Met Pro Ala Glu Val Ala Trp Ala Ala Gly Ala Glu Gly  
 145 150 155 160

Pro Val Thr Met Val Ser Asp Gly Cys Thr Ser Gly Leu Asp Ser Val  
 165 170 175



Gly Tyr Ala Val Gln Gly Thr Arg Glu Gly Ser Ala Asp Val Val Val  
 180 185 190

Ala Gly Ala Ala Asp Thr Pro Val Ser Pro Ile Val Val Ala Cys Phe  
 195 200 205

Asp Ala Ile Lys Ala Thr Thr Pro Arg Asn Asp Asp Pro Ala His Ala  
 210 215 220

Ser Arg Pro Phe Asp Gly Thr Arg Asn Gly Phe Val Leu Ala Glu Gly  
 225 230 235 240

Ala Ala Met Phe Val Leu Glu Glu Tyr Glu Ala Ala Gln Arg Arg Gly  
 245 250 255

Ala His Ile Tyr Ala Glu Val Gly Gly Tyr Ala Thr Arg Ser Gln Ala  
 260 265 270

Tyr His Met Thr Gly Leu Lys Lys Asp Gly Arg Glu Met Ala Glu Ser  
 275 280 285

Ile Arg Ala Ala Leu Asp Glu Ala Arg Leu Asp Arg Thr Ala Val Asp  
 290 295 300

Tyr Val Asn Ala His Gly Ser Gly Thr Lys Gln Asn Asp Arg His Glu  
 305 310 315 320

Thr Ala Ala Phe Lys Arg Ser Leu Gly Glu His Ala Tyr Ala Val Pro  
 325 330 335

Val Ser Ser Ile Lys Ser Met Gly Gly His Ser Leu Gly Ala Ile Gly  
 340 345 350

Ser Ile Glu Ile Ala Ala Ser Val Leu Ala Ile Glu His Asn Val Val  
 355 360 365

Pro Pro Thr Ala Asn Leu His Thr Pro Asp Pro Glu Cys Asp Leu Asp  
 370 375 380

Tyr Val Pro Leu Thr Ala Arg Glu Gln Arg Val Asp Thr Val Leu Thr  
 385 390 395 400

Val Gly Ser Gly Phe Gly Gly Phe Gln Ser Ala Met Val Leu His Arg  
 405 410 415

Pro Glu Glu Ala Ala  
 420

<210> 12

<211> 422

<212> PRT

<213> *Saccharopolyspora hirsuta*

<400> 12

Met Thr Arg Arg Val Val Ile Thr Gly Val Gly Val Arg Ala Pro Gly  
 1 5 10 15

Gly Leu Gly Ala Lys Asn Phe Trp Glu Leu Leu Thr Ser Gly Arg Thr  
 20 25 30

Ala Thr Arg Arg Ile Ser Phe Phe Asp Pro Thr Pro Asn Arg Ser Gln  
 35 40 45

Ile Ala Ala Glu Cys Asp Phe Asp Pro Glu His Glu Gly Leu Ser Pro  
 50 55 60

Arg Glu Ile Arg Arg Met Asp Arg Ala Ala Gln Phe Ala Val Val Cys  
 65 70 75 80

Thr Arg Asp Ala Val Ala Asp Ser Gly Leu Glu Phe Glu Gln Val Pro  
 85 90 95

Pro Glu Arg Ile Gly Val Ser Leu Gly Ser Ala Val Ala Ala Ala Thr  
 100 105 110

Ser Leu Glu Gln Glu Tyr Leu Val Leu Ser Asp Gly Gly Arg Glu Trp  
 115 120 125

Gln Val Asp Pro Ala Tyr Leu Ser Ala His Met Phe Asp Tyr Leu Ser  
 130 135 140

Pro Gly Val Met Pro Ala Glu Val Ala Trp Thr Val Gly Ala Glu Gly  
 145 150 155 160

Pro Val Ala Met Val Ser Asp Gly Cys Thr Ser Gly Leu Asp Ser Leu  
 165 170 175

Ser His Ala Cys Ser Leu Ile Ala Glu Gly Thr Thr Asp Val Met Val  
 180 185 190

Ala Gly Ala Ala Asp Thr Pro Ile Thr Pro Ile Val Val Ser Cys Phe  
 195 200 205

Asp Ala Ile Lys Ala Thr Thr Pro Arg Asn Asp Asp Pro Glu His Ala  
 210 215 220

Ser Arg Pro Phe Asp Asn Ser Arg Asn Gly Phe Val Leu Ala Glu Gly  
 225 230 235 240

Ala Ala Leu Phe Val Leu Glu Glu Leu Glu His Ala Arg Ala Arg Gly  
 245 250 255

Ala His Val Tyr Ala Glu Ile Ser Gly Cys Ala Thr Arg Leu Asn Ala  
 260 265 270

Tyr His Met Thr Gly Leu Lys Thr Asp Gly Arg Glu Met Ala Glu Ala  
 275 280 285

Ile Arg Val Ala Leu Asp Leu Ala Arg Ile Asp Pro Thr Asp Ile Asp  
 290 295 300

Tyr Ile Asn Ala His Gly Ser Gly Thr Lys Gln Asn Asp Arg His Glu  
 305 310 315 320

Thr Ala Ala Phe Lys Arg Ser Leu Gly Glu His Ala Tyr Arg Thr Pro  
 325 330 335

Val Ser Ser Ile Lys Ser Met Val Gly His Ser Leu Gly Ala Ile Gly  
 340 345 350

Ser Ile Glu Val Ala Ala Cys Ala Leu Ala Ile Glu His Gly Val Val  
 355 360 365

Pro Pro Thr Ala Asn Leu His Glu Pro Asp Pro Glu Cys Asp Leu Asp  
 370 375 380

Tyr Val Pro Leu Thr Ala Arg Glu Gln Arg Val Asp Thr Val Leu Ser  
 385 390 395 400

Val Gly Ser Gly Phe Gly Gly Phe Gln Ser Ala Met Val Leu Arg Arg  
 405 410 415

Leu Gly Gly Ala Asn Ser  
 420

<210> 13

<211> 424

<212> PRT

<213> Streptomyces coelicolor

<400> 13

Met Lys Arg Arg Val Val Ile Thr Gly Val Gly Val Arg Ala Pro Gly  
 1 5 10 15

Gly Asn Gly Thr Arg Gln Phe Trp Glu Leu Leu Thr Ser Gly Arg Thr  
 20 25 30

Ala Thr Arg Arg Ile Ser Phe Phe Asp Pro Ser Pro Tyr Arg Ser Gln  
 35 40 45

Val Ala Ala Glu Ala Asp Phe Asp Pro Val Ala Glu Gly Phe Gly Pro  
 50 55 60

Arg Glu Leu Asp Arg Met Asp Arg Ala Ser Gln Phe Ala Val Ala Cys  
 65 70 75 80

Ala Arg Glu Ala Phe Ala Ala Ser Gly Leu Asp Pro Asp Thr Leu Asp  
 85 90 95

Pro Ala Arg Val Gly Val Ser Leu Gly Ser Ala Val Ala Ala Thr  
 100 105 110

Ser Leu Glu Arg Glu Tyr Leu Leu Leu Ser Asp Ser Gly Arg Asp Trp  
 115 120 125

Glu Val Asp Ala Ala Trp Leu Ser Arg His Met Phe Asp Tyr Leu Val  
 130 135 140

Pro Ser Val Met Pro Ala Glu Val Ala Trp Ala Val Gly Ala Glu Gly  
 145 150 155 160

Pro Val Thr Met Val Ser Thr Gly Cys Thr Ser Gly Leu Asp Ser Val  
 165 170 175

Gly Asn Ala Val Arg Ala Ile Glu Glu Gly Ser Ala Asp Val Met Phe  
 180 185 190

Ala Gly Ala Ala Asp Thr Pro Ile Thr Pro Ile Val Val Ala Cys Phe  
 195 200 205

Asp Ala Ile Arg Ala Thr Thr Ala Arg Asn Asp Asp Pro Glu His Ala  
 210 215 220

Ser Arg Pro Phe Asp Gly Thr Arg Asp Gly Phe Val Leu Ala Glu Gly  
 225 230 235 240

Ala Ala Met Phe Val Leu Glu Asp Tyr Asp Ser Ala Leu Ala Arg Gly  
 245 250 255

Ala Arg Ile His Ala Glu Ile Ser Gly Tyr Ala Thr Arg Cys Asn Ala  
260 265 270

Tyr His Met Thr Gly Leu Lys Ala Asp Gly Arg Glu Met Ala Glu Thr  
275 280 285

Ile Arg Val Ala Leu Asp Glu Ser Arg Thr Asp Ala Thr Asp Ile Asp  
290 295 300

Tyr Ile Asn Ala His Gly Ser Gly Thr Arg Gln Asn Asp Arg His Glu  
305 310 315 320

Thr Ala Ala Tyr Lys Arg Ala Leu Gly Glu His Ala Arg Arg Thr Pro  
325 330 335

Val Ser Ser Ile Lys Ser Met Val Gly His Ser Leu Gly Ala Ile Gly  
340 345 350

Ser Leu Glu Ile Ala Ala Cys Val Leu Ala Leu Glu His Gly Val Val  
355 360 365

Pro Pro Thr Ala Asn Leu Arg Thr Ser Asp Pro Glu Cys Asp Leu Asp  
370 375 380

Tyr Val Pro Leu Glu Ala Arg Glu Arg Lys Leu Arg Ser Val Leu Thr  
385 390 395 400

Val Gly Ser Gly Phe Gly Gly Phe Gln Ser Ala Met Val Leu Arg Asp  
405 410 415

Ala Glu Thr Ala Gly Ala Ala Ala  
420

&lt;210&gt; 14

&lt;211&gt; 420

&lt;212&gt; PRT

&lt;213&gt; Streptomyces cinnamomensis

&lt;400&gt; 14

Met Thr Gln Arg Arg Val Ala Ile Thr Gly Ile Glu Val Leu Ala Pro  
 1 5 10 15

Gly Gly Leu Gly Arg Lys Glu Phe Trp Gln Leu Leu Ser Glu Gly Arg  
 20 25 30

Thr Ala Thr Arg Gly Ile Thr Phe Phe Asp Pro Ala Pro Phe Arg Ser  
 35 40 45

Lys Val Ala Ala Glu Ala Asp Phe Cys Gly Leu Glu Asn Gly Leu Ser  
 50 55 60

Pro Gln Glu Val Arg Arg Met Asp Arg Ala Ala Gln Phe Ala Val Val  
 65 70 75 80

Thr Ala Arg Ala Val Glu Asp Ser Gly Ala Glu Leu Ala Ala His Pro  
 85 90 95

Pro His Arg Ile Gly Val Val Val Gly Ser Ala Val Gly Ala Thr Met  
 100 105 110

Gly Leu Asp Asn Glu Tyr Arg Val Val Ser Asp Gly Gly Arg Leu Asp  
 115 120 125

Leu Val Asp His Arg Tyr Ala Val Pro His Leu Tyr Asn Tyr Leu Val  
 130 135 140

Pro Ser Ser Phe Ala Ala Glu Val Ala Trp Ala Val Gly Ala Glu Gly  
 145 150 155 160

Pro Ser Thr Val Val Ser Thr Gly Cys Thr Ser Gly Ile Asp Ala Val  
 165 170 175

Gly Ile Ala Val Glu Leu Val Arg Glu Gly Ser Val Asp Val Met Val  
 180 185 190

Ala Gly Ala Val Asp Ala Pro Ile Ser Pro Ile Pro Cys Val Leu Asp  
 195 200 205

Ala Ile Lys Ala Thr Thr Pro Arg His Asp Ala Pro Ala Thr Ala Ser  
 210 215 220

Arg Pro Phe Asp Ser Thr Arg Asn Gly Phe Val Leu Gly Glu Gly Ala  
 225 230 235 240

Ala Phe Phe Val Leu Glu Glu Leu His Ser Ala Arg Arg Arg Gly Ala  
 245 250 255

His Ile Tyr Ala Glu Ile Ala Gly Tyr Ala Thr Arg Ser Asn Ala Tyr  
 260 265 270

His Met Thr Gly Leu Arg Asp Gly Ala Glu Met Ala Glu Ala Ile Arg  
 275 280 285

Leu Ala Leu Asp Glu Ala Arg Leu Asn Pro Glu Gln Val Asp Tyr Ile  
 290 295 300

Asn Ala His Gly Ser Gly Thr Lys Gln Asn Asp Arg His Glu Thr Ala  
 305 310 315 320

Ala Phe Lys Lys Ala Leu Gly Glu His Ala Tyr Arg Thr Pro Val Ser  
 325 330 335

Ser Ile Lys Ser Met Val Gly His Ser Leu Gly Ala Ile Gly Ser Ile  
 340 345 350

Glu Ile Ala Ala Ser Ala Leu Ala Met Glu Tyr Asp Val Val Pro Pro  
 355 360 365

Thr Ala Asn Leu His Thr Pro Asp Pro Glu Cys Asp Leu Asp Tyr Val  
 370 375 380



Pro Leu Thr Ala Arg Asp Gln Arg Val Asp Ser Val Leu Thr Val Gly  
 385 390 395 400

Ser Gly Phe Gly Gly Phe Gln Ser Ala Met Val Leu Thr Ser Ala Gln  
 405 410 415

Arg Ser Thr Val  
 420

<210> 15

<211> 422

<212> PRT

<213> Streptomyces venezuelae

<400> 15

Met Thr Ala Arg Arg Val Val Ile Thr Gly Ile Glu Val Leu Ala Pro  
 1 5 10 15

Gly Gly Thr Gly Ser Lys Ala Phe Trp Asn Leu Leu Ser Glu Gly Arg  
 20 25 30

Thr Ala Thr Arg Gly Ile Thr Phe Phe Asp Pro Thr Pro Phe Arg Ser  
 35 40 45

Arg Val Ala Ala Glu Ile Asp Phe Asp Pro Glu Ala His Gly Leu Ser  
 50 55 60

Pro Gln Glu Ile Arg Arg Met Asp Arg Ala Ala Gln Phe Ala Val Val  
 65 70 75 80

Ala Ala Arg Ala Val Ala Asp Ser Gly Ile Asp Leu Ala Ala His Asp  
 85 90 95

Pro Tyr Arg Val Gly Val Thr Val Gly Ser Ala Val Gly Ala Thr Met  
 100 105 110

Gly Leu Asp Glu Glu Tyr Arg Val Val Ser Asp Gly Gly Arg Leu Asp  
 115 120 125

Leu Val Asp His Ala Tyr Ala Val Pro His Leu Tyr Asp Tyr Met Val  
 130 135 140

Pro Ser Ser Phe Ser Ala Glu Val Ala Trp Ala Val Gly Ala Glu Gly  
 145 150 155 160

Pro Asn Thr Val Val Ser Thr Gly Cys Thr Ser Gly Leu Asp Ser Val  
 165 170 175

Gly Tyr Ala Arg Gly Glu Leu Ile Arg Glu Gly Ser Ala Asp Val Met  
 180 185 190

Ile Ala Gly Ser Ser Asp Ala Pro Ile Ser Pro Ile Thr Met Ala Cys  
 195 200 205

Phe Asp Ala Ile Lys Ala Thr Thr Asn Arg Tyr Asp Asp Pro Ala His  
 210 215 220

Ala Ser Arg Pro Phe Asp Gly Thr Arg Asn Gly Phe Val Leu Gly Glu  
 225 230 235 240

Gly Ala Ala Val Phe Val Leu Glu Glu Leu Glu Ser Ala Arg Ala Arg  
 245 250 255

Gly Ala His Ile Tyr Ala Glu Ile Ala Gly Tyr Ala Thr Arg Ser Asn  
 260 265 270

Ala Tyr His Met Thr Gly Leu Arg Pro Asp Gly Ala Glu Met Ala Glu  
 275 280 285

Ala Ile Arg Val Ala Leu Asp Glu Ala Arg Met Asn Pro Thr Glu Ile  
 290 295 300

Asp Tyr Ile Asn Ala His Gly Ser Gly Thr Lys Gln Asn Asp Arg His  
 305 310 315 320

Glu Thr Ala Ala Phe Lys Lys Ser Leu Gly Asp His Ala Tyr Arg Thr  
 325 330 335

Pro Val Ser Ser Ile Lys Ser Met Val Gly His Ser Leu Gly Ala Ile  
 340 345 350

Gly Ser Ile Glu Ile Ala Ala Ser Ala Leu Ala Met Glu His Asn Val  
 355 360 365

Val Pro Pro Thr Gly Asn Leu His Thr Pro Asp Pro Glu Cys Asp Leu  
 370 375 380

Asp Tyr Val Arg Ser Cys Arg Glu Gln Leu Thr Asp Ser Val Leu Thr  
 385 390 395 400

Val Gly Ser Gly Phe Gly Gly Phe Gln Ser Ala Met Val Leu Ala Arg  
 405 410 415

Pro Glu Arg Lys Ile Ala  
 420

<210> 16

<211> 430

<212> PRT

<213> Streptomyces nogalater

<400> 16

Met Lys Glu Ser Ile Asn Arg Arg Val Val Ile Thr Gly Ile Gly Ile  
 1 5 10 15

Val Ala Pro Asp Ala Thr Gly Val Lys Pro Phe Trp Asp Leu Leu Thr  
 20 25 30

Ala Gly Arg Thr Ala Thr Arg Thr Ile Thr Ala Phe Asp Pro Ser Pro  
 35 40 45

Phe Arg Ser Arg Ile Ala Ala Glu Cys Asp Phe Asp Pro Leu Ala Glu  
 50 55 60

Gly Leu Thr Pro Gln Gln Ile Arg Arg Met Asp Arg Ala Thr Gln Phe  
 65 70 75 80

Ala Val Val Ser Ala Arg Glu Ser Leu Glu Asp Ser Gly Leu Asp Leu  
 85 90 95

Gly Ala Leu Asp Ala Ser Arg Thr Gly Val Val Val Gly Ser Ala Val  
 100 105 110

Gly Cys Thr Thr Ser Leu Glu Glu Glu Tyr Ala Val Val Ser Asp Ser  
 115 120 125

Gly Arg Asn Trp Leu Val Asp Asp Gly Tyr Ala Val Pro His Leu Phe  
 130 135 140

Asp Tyr Phe Val Pro Ser Ser Ile Ala Ala Glu Val Ala His Asp Arg  
 145 150 155 160

Ile Gly Ala Glu Gly Pro Val Ser Leu Val Ser Thr Gly Cys Thr Ser  
 165 170 175

Gly Leu Asp Ala Val Gly Arg Ala Ala Asp Leu Ile Ala Glu Gly Ala  
 180 185 190

Ala Asp Val Met Leu Ala Gly Ala Thr Glu Ala Pro Ile Ser Pro Ile  
 195 200 205

Thr Val Ala Cys Phe Asp Ala Ile Lys Ala Thr Thr Pro Arg Asn Asp  
 210 215 220

Thr Pro Ala Glu Ala Ser Arg Pro Phe Asp Arg Thr Arg Asn Gly Phe  
 225 230 235 240

Val Leu Gly Glu Gly Ala Ala Val Phe Val Leu Glu Glu Phe Glu His  
 245 250 255

Ala Arg Arg Arg Gly Ala Leu Val Tyr Ala Glu Ile Ala Gly Phe Ala  
 260 265 270

Thr Arg Cys Asn Ala Phe His Met Thr Gly Leu Arg Pro Asp Gly Arg  
 275 280 285

Glu Met Ala Glu Ala Ile Gly Val Ala Leu Ala Gln Ala Gly Lys Ala  
 290 295 300

Pro Ala Asp Val Asp Tyr Val Asn Ala His Gly Ser Gly Thr Arg Gln  
 305 310 315 320

Asn Asp Arg His Glu Thr Ala Ala Phe Lys Arg Ser Leu Gly Asp His  
 325 330 335

Ala Tyr Arg Val Pro Val Ser Ser Ile Lys Ser Met Ile Gly His Ser  
 340 345 350

Leu Gly Ala Ile Gly Ser Leu Glu Ile Ala Ala Ser Val Leu Ala Ile  
 355 360 365

Thr His Asp Val Val Pro Pro Thr Ala Asn Leu His Glu Pro Asp Pro  
 370 375 380

Glu Cys Asp Leu Asp Tyr Val Pro Leu Arg Ala Arg Ala Cys Pro Val  
 385 390 395 400

Asp Thr Val Leu Thr Val Gly Ser Gly Phe Gly Gly Phe Gln Ser Ala  
 405 410 415

Met Val Leu Cys Gly Pro Gly Ser Arg Gly Arg Ser Ala Ala  
 420 425 430

&lt;210&gt; 17

&lt;211&gt; 426

&lt;212&gt; PRT

&lt;213&gt; Streptomyces glaucescens

&lt;400&gt; 17

Met Thr Arg His Ala Glu Lys Arg Val Val Ile Thr Gly Ile Gly Val

1

5

10

15

Arg Ala Pro Gly Gly Ala Gly Thr Ala Ala Phe Trp Asp Leu Leu Thr

20

25

30

Ala Gly Arg Thr Ala Thr Arg Thr Ile Ser Leu Phe Asp Ala Ala Pro

35

40

45

Tyr Arg Ser Arg Ile Ala Gly Glu Ile Asp Phe Asp Pro Ile Gly Glu

50

55

60

Gly Leu Ser Pro Arg Gln Ala Ser Thr Tyr Asp Arg Ala Thr Gln Leu

65

70

75

80

Ala Val Val Cys Ala Arg Glu Ala Leu Lys Asp Ser Gly Leu Asp Pro

85

90

95

Ala Ala Val Asn Pro Glu Arg Ile Gly Val Ser Ile Gly Thr Ala Val

100

105

110

Gly Cys Thr Thr Gly Leu Asp Arg Glu Tyr Ala Arg Val Ser Glu Gly

115

120

125

Gly Ser Arg Trp Leu Val Asp His Thr Leu Ala Val Glu Gln Leu Phe

130

135

140

Asp Tyr Phe Val Pro Thr Ser Ile Cys Arg Glu Val Ala Trp Glu Ala

145

150

155

160

Gly Ala Glu Gly Pro Val Thr Val Val Ser Thr Gly Cys Thr Ser Gly

165

170

175

Leu Asp Ala Val Gly Tyr Gly Thr Glu Leu Ile Arg Asp Gly Arg Ala  
 180 185 190

Asp Val Val Val Cys Gly Ala Thr Asp Ala Pro Ile Ser Pro Ile Thr  
 195 200 205

Val Ala Cys Phe Asp Ala Ile Lys Ala Thr Ser Ala Asn Asn Asp Asp  
 210 215 220

Pro Ala His Ala Ser Arg Pro Phe Asp Arg Asn Arg Asp Gly Phe Val  
 225 230 235 240

Leu Gly Glu Gly Ser Ala Val Phe Val Leu Glu Glu Leu Ser Ala Ala  
 245 250 255

Arg Arg Arg Gly Ala His Ala Tyr Ala Glu Val Arg Gly Phe Ala Thr  
 260 265 270

Arg Ser Asn Ala Phe His Met Thr Gly Leu Lys Pro Asp Gly Arg Glu  
 275 280 285

Met Ala Glu Ala Ile Thr Ala Ala Leu Asp Gln Ala Arg Arg Thr Gly  
 290 295 300

Asp Asp Leu His Tyr Ile Asn Ala His Gly Ser Gly Thr Arg Gln Asn  
 305 310 315 320

Asp Arg His Glu Thr Ala Ala Phe Lys Arg Ser Leu Gly Gln Arg Ala  
 325 330 335

Tyr Asp Val Pro Val Ser Ser Ile Lys Ser Met Ile Gly His Ser Leu  
 340 345 350

Gly Ala Ile Gly Ser Leu Glu Leu Ala Ala Cys Ala Leu Ala Ile Glu  
 355 360 365

His Gly Val Ile Pro Pro Thr Ala Asn Tyr Glu Glu Pro Asp Pro Glu  
 370 375 380

Cys Asp Leu Asp Tyr Val Pro Asn Val Ala Arg Glu Gln Arg Val Asp  
 385 390 395 400

Thr Val Leu Ser Val Gly Ser Gly Phe Gly Gly Phe Gln Ser Ala Ala  
 405 410 415

Val Leu Ala Arg Pro Lys Glu Thr Arg Ser  
 420 425

<210> 18

<211> 418

<212> PRT

<213> Streptomyces sp. C5

<400> 18

Met Asn Arg Arg Val Val Ile Thr Gly Met Gly Val Val Ala Pro Gly  
 1 5 10 15

Ala Ile Gly Ile Lys Ser Phe Trp Glu Leu Leu Leu Ser Gly Thr Thr  
 20 25 30

Ala Thr Arg Ala Ile Thr Thr Phe Asp Ala Thr Pro Phe Arg Ser Arg  
 35 40 45

Ile Ala Ala Glu Cys Asp Phe Asp Pro Val Ala Ala Gly Leu Ser Ala  
 50 55 60

Glu Gln Ala Arg Arg Leu Asp Arg Ala Gly Gln Phe Ala Leu Val Ala  
 65 70 75 80

Gly Gln Glu Ala Leu Thr Asp Ser Gly Leu Arg Ile Gly Glu Asp Ser  
 85 90 95

Ala His Arg Val Gly Val Cys Val Gly Thr Ala Val Gly Cys Thr Gln  
 100 105 110



Lys Leu Glu Ser Glu Tyr Val Ala Leu Ser Ala Gly Gly Ala Asn Trp  
 115 120 125

Val Val Asp Pro His Arg Gly Ala Pro Glu Leu Tyr Asp Tyr Phe Val  
 130 135 140

Pro Ser Ser Leu Ala Ala Glu Val Ala Trp Leu Ala Gly Ala Glu Gly  
 145 150 155 160

Pro Val Asn Ile Val Ser Ala Gly Cys Thr Ser Gly Ile Asp Ser Ile  
 165 170 175

Gly Tyr Ala Cys Glu Leu Ile Arg Glu Gly Thr Val Asp Val Met Leu  
 180 185 190

Ala Gly Gly Val Asp Ala Pro Ile Ala Pro Ile Thr Val Ala Cys Phe  
 195 200 205

Asp Ala Ile Arg Val Thr Ser Asp His Asn Asp Thr Pro Glu Thr Leu  
 210 215 220

Ala Pro Phe Ser Arg Ser Arg Asn Gly Phe Val Leu Gly Glu Gly Gly  
 225 230 235 240

Ala Ile Val Val Leu Glu Glu Ala Glu Ala Ala Val Arg Arg Gly Ala  
 245 250 255

Arg Ile Tyr Ala Glu Ile Gly Gly Tyr Ala Ser Arg Gly Asn Ala Tyr  
 260 265 270

His Met Thr Gly Leu Arg Ala Asp Gly Ala Glu Met Ala Ala Ala Ile  
 275 280 285

Thr Ala Ala Leu Asp Glu Ala Arg Arg Asp Pro Ser Asp Val Asp Tyr  
 290 295 300

Val Asn Ala His Gly Thr Ala Thr Arg Gln Asn Asp Arg His Glu Thr  
 305 310 315 320

Ser Ala Phe Lys Arg Ser Leu Gly Asp His Ala Tyr Arg Val Pro Ile  
 325 330 335

Ser Ser Val Lys Ser Met Ile Gly His Ser Leu Gly Ala Ala Gly Ser  
 340 345 350

Leu Glu Val Ala Ala Thr Ala Leu Ala Val Glu Tyr Gly Ala Ile Pro  
 355 360 365

Pro Thr Ala Asn Leu His Asp Pro Asp Pro Glu Leu Asp Leu Asp Tyr  
 370 375 380

Val Pro Leu Thr Ala Arg Glu Lys Arg Val Arg His Ala Leu Thr Val  
 385 390 395 400

Gly Ser Gly Phe Gly Gly Phe Gln Ser Ala Met Leu Leu Ser Arg Pro  
 405 410 415

Glu Arg

<210> 19

<211> 419

<212> PRT

<213> Streptomyces peucetius

<400> 19

Met Asn Arg Arg Ile Val Ile Thr Gly Ile Gly Val Val Ala Pro Gly  
 1 5 10 15

Ala Val Gly Thr Lys Pro Phe Trp Glu Leu Leu Leu Ser Gly Thr Thr  
 20 25 30

Ala Thr Arg Ala Ile Ser Thr Phe Asp Ala Thr Pro Phe Arg Ser Arg  
 35 40 45

Ile Ala Ala Glu Cys Asp Phe Asp Pro Val Ala Ala Gly Leu Ser Ala  
 50 55 60

Glu Gln Ala Arg Arg Leu Asp Arg Ala Gly Gln Phe Ala Leu Val Ala  
 65 70 75 80

Gly Gln Glu Ala Leu Ala Asp Ser Gly Leu Arg Ile Asp Glu Asp Ser  
 85 90 95

Ala His Arg Val Gly Val Cys Val Gly Thr Ala Val Gly Cys Thr Gln  
 100 105 110

Lys Leu Glu Ser Glu Tyr Val Ala Leu Ser Ala Gly Gly Ala His Trp  
 115 120 125

Val Val Asp Pro Gly Arg Gly Ser Pro Glu Leu Tyr Asp Tyr Phe Val  
 130 135 140

Pro Ser Ser Leu Ala Ala Glu Val Ala Trp Leu Ala Gly Ala Glu Gly  
 145 150 155 160

Pro Val Asn Ile Val Ser Ala Gly Cys Thr Ser Gly Ile Asp Ser Ile  
 165 170 175

Gly Tyr Ala Cys Glu Leu Ile Arg Glu Gly Thr Val Asp Ala Met Val  
 180 185 190

Ala Gly Gly Val Asp Ala Pro Ile Ala Pro Ile Thr Val Ala Cys Phe  
 195 200 205

Asp Ala Ile Arg Ala Thr Ser Asp His Asn Asp Thr Pro Glu Thr Ala  
 210 215 220

Ser Arg Pro Phe Ser Arg Ser Arg Asn Gly Phe Val Leu Gly Glu Gly  
 225 230 235 240

Gly Ala Ile Val Val Leu Glu Glu Ala Glu Ala Ala Val Arg Arg Gly  
 245 250 255

Ala Arg Ile Tyr Ala Glu Ile Gly Gly Tyr Ala Ser Arg Gly Asn Ala  
 260 265 270

Tyr His Met Thr Gly Leu Arg Ala Asp Gly Ala Glu Met Ala Ala Ala  
 275 280 285

Ile Thr Ala Ala Leu Asp Glu Ala Arg Arg Asp Pro Ser Asp Val Asp  
 290 295 300

Tyr Val Asn Ala His Gly Thr Ala Thr Lys Gln Asn Asp Arg His Glu  
 305 310 315 320

Thr Ser Ala Phe Lys Arg Ser Leu Gly Glu His Ala Tyr Arg Val Pro  
 325 330 335

Ile Ser Ser Ile Lys Ser Met Ile Gly His Ser Leu Gly Ala Val Gly  
 340 345 350

Ser Leu Glu Val Ala Ala Thr Ala Leu Ala Val Glu Tyr Gly Val Ile  
 355 360 365

Pro Pro Thr Ala Asn Leu His Asp Pro Asp Pro Glu Leu Asp Leu Asp  
 370 375 380

Tyr Val Pro Leu Thr Ala Arg Glu Lys Arg Val Arg His Ala Leu Thr  
 385 390 395 400

Val Gly Ser Gly Phe Gly Gly Phe Gln Ser Ala Met Leu Leu Ser Arg  
 405 410 415

Leu Glu Arg

&lt;210&gt; 20

&lt;211&gt; 423

&lt;212&gt; PRT

&lt;213&gt; Streptomyces coelicolor

&lt;400&gt; 20

Met Thr Arg Arg Arg Val Ala Val Thr Gly Ile Gly Val Val Ala Pro

1 5 10 15

Gly Gly Ile Gly Thr Pro Gln Phe Trp Arg Leu Leu Ser Glu Gly Arg

20 25 30

Thr Ala Thr Arg Arg Ile Ser Leu Phe Asp Pro Ser Gly Leu Arg Ser

35 40 45

Gln Ile Ala Ala Glu Cys Asp Phe Glu Pro Ser Asp His Gly Leu Gly

50 55 60

Leu Ala Thr Ala Gln Arg Cys Asp Arg Tyr Val Gln Phe Ala Leu Val

65 70 75 80

Ala Ala Ser Glu Ala Val Arg Asp Ala Asn Leu Asp Met Asn Arg Glu

85 90 95

Asp Pro Trp Arg Ala Gly Ala Thr Leu Gly Thr Ala Val Gly Gly Thr

100 105 110

Thr Arg Leu Glu His Asp Tyr Val Leu Val Ser Glu Arg Gly Ser Arg

115 120 125

Trp Asp Val Asp Asp Arg Arg Ser Glu Pro His Leu Glu Arg Ala Phe

130 135 140

Thr Pro Ala Thr Leu Ser Ser Ala Val Ala Glu Glu Phe Gly Val Arg

145 150 155 160

Gly Pro Val Gln Thr Val Ser Thr Gly Cys Thr Ser Gly Leu Asp Ala

165 170 175

Val Gly Tyr Ala Tyr His Ala Val Ala Glu Gly Arg Val Asp Val Cys  
 180 185 190

Leu Ala Gly Ala Ala Asp Ser Pro Ile Ser Pro Ile Thr Met Ala Cys  
 195 200 205

Phe Asp Ala Ile Lys Ala Thr Ser Pro Asn Asn Asp Asp Pro Ala His  
 210 215 220

Ala Ser Arg Pro Phe Asp Ala Asp Arg Asn Gly Phe Val Met Gly Glu  
 225 230 235 240

Gly Ala Ala Val Leu Val Leu Glu Asp Leu Glu His Ala Arg Ala Arg  
 245 250 255

Gly Ala Asp Val Tyr Cys Glu Val Ser Gly Tyr Ala Thr Phe Gly Asn  
 260 265 270

Ala Tyr His Met Thr Gly Leu Thr Lys Glu Gly Leu Glu Met Ala Arg  
 275 280 285

Ala Ile Asp Thr Ala Leu Asp Met Ala Glu Leu Asp Gly Ser Ala Ile  
 290 295 300

Asp Tyr Val Asn Ala His Gly Ser Gly Thr Gln Gln Asn Asp Arg His  
 305 310 315 320

Glu Thr Ala Ala Val Lys Arg Ser Leu Gly Glu His Ala Tyr Ala Thr  
 325 330 335

Pro Met Ser Ser Ile Lys Ser Met Val Gly His Ser Leu Gly Ala Ile  
 340 345 350

Gly Ser Ile Glu Leu Ala Ala Cys Val Leu Ala Met Ala His Gln Val  
 355 360 365

Val Pro Pro Thr Ala Asn Tyr Thr Thr Pro Asp Pro Glu Cys Asp Leu  
 370 375 380

Asp Tyr Val Pro Arg Glu Ala Arg Glu Arg Thr Leu Arg His Val Leu  
 385 390 395 400

Ser Val Gly Ser Gly Phe Gly Gly Phe Gln Ser Ala Val Val Leu Ser  
 405 410 415

Gly Ser Glu Gly Gly Leu Arg  
 420

<210> 21

<211> 871

<212> PRT

<213> Streptomyces caelestis

<400> 21

Met Ala Gly His Gly Asp Ala Thr Ala Gln Lys Ala Gln Asp Ala Glu  
 1 5 10 15

Lys Ser Glu Asp Gly Ser Asp Ala Ile Ala Val Ile Gly Met Ser Cys  
 20 25 30

Arg Phe Pro Gly Ala Pro Gly Thr Ala Glu Phe Trp Gln Leu Leu Ser  
 35 40 45

Ser Gly Ala Asp Ala Val Val Thr Ala Ala Asp Gly Arg Arg Arg Gly  
 50 55 60

Thr Ile Asp Ala Pro Ala Asp Phe Asp Ala Ala Phe Phe Gly Met Ser  
 65 70 75 80

Pro Arg Glu Ala Ala Ala Thr Asp Pro Gln Gln Arg Leu Val Leu Glu  
 85 90 95

Leu Gly Trp Glu Ala Leu Glu Asp Ala Gly Ile Val Pro Glu Ser Leu  
 100 105 110

Arg Gly Glu Ala Ala Ser Val Phe Val Gly Ala Met Asn Asp Asp Tyr  
 115 120 125

Ala Thr Leu Leu His Arg Ala Gly Ala Pro Thr Asp Thr Tyr Thr Ala  
 130 135 140

Thr Gly Leu Gln His Ser Met Ile Ala Asn Arg Leu Ser Tyr Phe Leu  
 145 150 155 160

Gly Leu Arg Gly Pro Ser Leu Val Val Asp Thr Gly Gln Ser Ser Ser  
 165 170 175

Leu Val Ala Val Ala Leu Ala Val Glu Ser Leu Arg Gly Gly Thr Ser  
 180 185 190

Gly Ile Ala Leu Ala Gly Gly Val Asn Leu Val Leu Ala Glu Glu Gly  
 195 200 205

Ser Ala Ala Met Glu Arg Val Gly Ala Leu Ser Pro Asp Gly Arg Cys  
 210 215 220

His Thr Phe Asp Ala Arg Ala Asn Gly Tyr Val Arg Gly Glu Gly Gly  
 225 230 235 240

Ala Ile Val Val Leu Lys Pro Leu Ala Asp Ala Leu Ala Asp Gly Asp  
 245 250 255

Arg Val Tyr Cys Val Val Arg Gly Val Ala Thr Gly Asn Asp Gly Gly  
 260 265 270

Gly Pro Gly Leu Thr Val Pro Asp Arg Ala Gly Gln Glu Ala Val Leu  
 275 280 285

Arg Ala Ala Cys Asp Gln Ala Gly Val Arg Pro Ala Asp Val Arg Phe  
 290 295 300

Val Glu Leu His Gly Thr Gly Thr Pro Ala Gly Asp Pro Val Glu Ala  
 305 310 315 320



Glu Ala Leu Gly Ala Val Tyr Gly Thr Gly Arg Pro Ala Asn Glu Pro  
 325 330 335

Leu Leu Val Gly Ser Val Lys Thr Asn Ile Gly His Leu Glu Gly Ala  
 340 345 350

Ala Gly Ile Ala Gly Phe Val Lys Ala Ala Leu Cys Leu His Glu Arg  
 355 360 365

Ala Leu Pro Ala Ser Leu Asn Phe Glu Thr Pro Asn Pro Ala Ile Pro  
 370 375 380

Leu Glu Arg Leu Arg Leu Lys Val Gln Thr Ala His Ala Ala Leu Gln  
 385 390 395 400

Pro Gly Thr Gly Gly Gly Pro Leu Leu Ala Gly Val Ser Ala Phe Gly  
 405 410 415

Met Gly Gly Thr Asn Cys His Val Val Leu Glu Glu Thr Pro Gly Gly  
 420 425 430

Arg Gln Pro Ala Glu Thr Gly Gln Ala Asp Ala Cys Leu Phe Ser Ala  
 435 440 445

Ser Pro Met Leu Leu Leu Ser Ala Arg Ser Glu Gln Ala Leu Arg Ala  
 450 455 460

Gln Ala Ala Arg Leu Arg Glu His Leu Glu Asp Ser Gly Ala Asp Pro  
 465 470 475 480

Leu Asp Ile Ala Tyr Ser Leu Ala Thr Thr Arg Thr Arg Phe Glu His  
 485 490 495

Arg Ala Ala Val Pro Cys Gly Asp Pro Asp Arg Leu Ser Ser Ala Leu  
 500 505 510

Ala Ala Leu Ala Ala Gly Gln Thr Pro Arg Gly Val Arg Ile Gly Ser  
 515 520 525

Thr Asp Ala Asp Gly Arg Leu Ala Leu Leu Phe Thr Gly Gln Gly Ala  
 530 535 540

Gln His Pro Gly Met Gly Gln Glu Leu Tyr Thr Thr Asp Pro His Phe  
 545 550 555 560

Ala Ala Ala Leu Asp Glu Val Cys Glu Glu Leu Gln Arg Cys Gly Thr  
 565 570 575

Gln Asn Leu Arg Glu Val Met Phe Thr Pro Asp Gln Pro Asp Leu Leu  
 580 585 590

Asp Arg Thr Glu Tyr Thr Gln Pro Ala Leu Phe Ala Leu Gln Thr Ala  
 595 600 605

Leu Tyr Arg Thr Leu Thr Ala Arg Gly Thr Gln Ala His Leu Val Leu  
 610 615 620

Gly His Ser Val Gly Glu Ile Thr Ala Ala His Ile Ala Gly Val Leu  
 625 630 635 640

Asp Leu Pro Asp Ala Ala Arg Leu Ile Thr Ala Arg Ala His Val Met  
 645 650 655

Gly Gln Leu Pro His Gly Gly Ala Met Leu Ser Val Gln Ala Ala Glu  
 660 665 670

His Asp Leu Asp Gln Leu Ala His Thr His Gly Val Glu Ile Ala Ala  
 675 680 685

Val Asn Gly Pro Thr His Cys Val Leu Ser Gly Pro Arg Thr Ala Leu  
 690 695 700

Glu Glu Thr Ala Gln His Leu Arg Glu Gln Asn Val Arg His Thr Trp  
 705 710 715 720

Leu Lys Val Ser His Ala Phe His Ser Ala Leu Met Asp Pro Met Leu  
 725 730 735

Gly Ala Phe Arg Asp Thr Leu Asn Thr Leu Asn Tyr Gln Pro Pro Thr  
                   740                  745                  750

Ile Pro Leu Ile Ser Asn Leu Thr Gly Gln Ile Ala Asp Pro Asn His  
                   755                  760                  765

Leu Cys Thr Pro Asp Tyr Trp Ile Asp His Ala Arg His Thr Val Arg  
                   770                  775                  780

Phe Ala Asp Ala Val Gln Thr Ala His His Gln Gly Thr Thr Thr Tyr  
                   785                  790                  795                  800

Leu Glu Ile Gly Pro His Pro Thr Leu Thr Thr Leu Leu His His Thr  
                   805                  810                  815

Leu Asp Asn Pro Thr Thr Ile Pro Thr Leu His Arg Glu Arg Pro Glu  
                   820                  825                  830

Pro Glu Thr Leu Thr Gln Ala Ile Ala Ala Val Gly Val Arg Thr Asp  
                   835                  840                  845

Gly Ile Asp Trp Ala Val Leu Cys Gly Ala Ser Arg Pro Arg Arg Val  
                   850                  855                  860

Glu Leu Pro Thr Tyr Ala Phe  
                   865                  870

<210> 22

<211> 890

<212> PRT

<213> Streptomyces ambofaciens

<400> 22

Met Ser Gly Glu Leu Ala Ile Ser Arg Ser Asp Asp Arg Ser Asp Ala  
           1                  5                  10                  15



Gly Tyr Val Arg Gly Glu Gly Gly Ala Ala Val Val Leu Lys Pro Leu  
 225 230 235 240

Ala Asp Ala Leu Ala Asp Gly Asp Pro Val Tyr Cys Val Val Arg Gly  
 245 250 255

Val Ala Val Gly Asn Asp Gly Gly Gly Pro Gly Leu Thr Ala Pro Asp  
 260 265 270

Arg Glu Gly Gln Glu Ala Val Leu Arg Ala Ala Cys Ala Gln Ala Arg  
 275 280 285

Val Asp Pro Ala Glu Val Arg Phe Val Glu Leu His Gly Thr Gly Thr  
 290 295 300

Pro Val Gly Asp Pro Val Glu Ala His Ala Leu Gly Ala Val His Gly  
 305 310 315 320

Ser Gly Arg Pro Ala Asp Asp Pro Leu Leu Val Gly Ser Val Lys Thr  
 325 330 335

Asn Ile Gly His Leu Glu Gly Ala Ala Gly Ile Ala Gly Leu Val Lys  
 340 345 350

Ala Ala Leu Cys Leu Arg Glu Arg Thr Leu Pro Gly Ser Leu Asn Phe  
 355 360 365

Ala Thr Pro Ser Pro Ala Ile Pro Leu Asp Gln Leu Arg Leu Lys Val  
 370 375 380

Gln Thr Ala Ala Ala Glu Leu Pro Leu Ala Pro Gly Gly Ala Pro Leu  
 385 390 395 400

Leu Ala Gly Val Ser Ser Phe Gly Ile Gly Gly Thr Asn Cys His Val  
 405 410 415

Val Leu Glu His Leu Pro Ser Arg Pro Thr Pro Ala Val Ser Val Ala  
 420 425 430

Ala Ser Leu Pro Asp Val Pro Pro Leu Leu Leu Ser Ala Arg Ser Glu  
 435 440 445

Gly Ala Leu Arg Ala Gln Ala Val Arg Leu Gly Glu Thr Val Glu Arg  
 450 455 460

Val Gly Ala Asp Pro Arg Asp Val Ala Tyr Ser Leu Ala Ser Thr Arg  
 465 470 475 480

Thr Leu Phe Glu His Arg Ala Val Val Pro Cys Gly Gly Arg Gly Glu  
 485 490 495

Leu Val Ala Ala Leu Gly Gly Phe Ala Ala Gly Arg Val Ser Gly Gly  
 500 505 510

Val Arg Ser Gly Arg Ala Val Pro Gly Gly Val Gly Val Leu Phe Thr  
 515 520 525

Gly Gln Gly Ala Gln Trp Val Gly Met Gly Arg Gly Leu Tyr Ala Gly  
 530 535 540

Gly Gly Val Phe Ala Glu Val Leu Asp Glu Val Leu Ser Met Val Gly  
 545 550 555 560

Glu Val Asp Gly Arg Ser Leu Arg Asp Val Met Phe Gly Asp Val Asp  
 565 570 575

Val Asp Ala Gly Ala Gly Ala Asp Ala Gly Ala Gly Ala Gly Ala Gly  
 580 585 590

Val Gly Ser Gly Ser Gly Ser Val Gly Gly Leu Leu Gly Arg Thr Glu  
 595 600 605

Phe Ala Gln Pro Ala Leu Phe Ala Leu Glu Val Ala Leu Phe Arg Ala  
 610 615 620

Leu Glu Ala Arg Gly Val Glu Val Ser Val Val Leu Gly His Ser Val  
 625 630 635 640

Gly Glu Val Ala Ala Ala Thr Val Ala Gly Val Leu Ser Leu Gly Asp  
 645 650 655

Ala Val Arg Leu Val Val Ala Arg Gly Gly Leu Met Gly Gly Leu Pro  
 660 665 670

Val Gly Gly Gly Met Trp Ser Val Gly Ala Ser Glu Ser Val Val Arg  
 675 680 685

Gly Val Val Glu Gly Leu Gly Glu Trp Val Ser Val Ala Ala Val Asn  
 690 695 700

Gly Pro Arg Ser Val Val Leu Ser Gly Asp Val Gly Val Leu Glu Ser  
 705 710 715 720

Val Val Ala Ser Leu Met Gly Asp Gly Val Glu Tyr Arg Arg Leu Asp  
 725 730 735

Val Ser His Gly Phe His Ser Val Leu Met Glu Pro Val Leu Gly Glu  
 740 745 750

Phe Arg Gly Val Val Glu Ser Leu Glu Phe Gly Arg Val Arg Pro Gly  
 755 760 765

Val Val Val Val Ser Gly Val Ser Gly Gly Val Val Gly Ser Gly Glu  
 770 775 780

Leu Gly Asp Pro Gly Tyr Trp Val Arg His Ala Arg Glu Ala Val Arg  
 785 790 795 800

Phe Ala Asp Gly Val Gly Val Val Arg Gly Leu Gly Val Gly Thr Leu  
 805 810 815

Val Glu Val Gly Pro His Gly Val Leu Thr Gly Met Ala Gly Glu Cys  
 820 825 830

Leu Gly Ala Gly Asp Asp Val Val Val Val Pro Ala Met Arg Arg Gly  
 835 840 845

Arg Ala Glu Arg Glu Val Phe Glu Ala Ala Leu Ala Thr Val Phe Thr  
 850 855 860

Arg Asp Ala Gly Leu Asp Ala Thr Ala Leu His Thr Gly Ser Thr Gly  
 865 870 875 880

Arg Arg Ile Asp Leu Pro Thr Thr Pro Phe  
 885 890

<210> 23

<211> 920

<212> PRT

<213> *Streptomyces cinnamonensis*

<400> 23

Met Ala Ala Ser Ala Ser Ala Ser Pro Ser Gly Pro Ser Ala Gly Pro  
 1 5 10 15

Asp Pro Ile Ala Val Val Gly Met Ala Cys Arg Leu Pro Gly Ala Pro  
 20 25 30

Asp Pro Asp Ala Phe Trp Arg Leu Leu Ser Glu Gly Arg Ser Ala Val  
 35 40 45

Ser Thr Ala Pro Pro Glu Arg Arg Arg Ala Asp Ser Gly Leu His Gly  
 50 55 60

Pro Gly Gly Tyr Leu Asp Arg Ile Asp Gly Phe Asp Ala Asp Phe Phe  
 65 70 75 80

His Ile Ser Pro Arg Glu Ala Val Ala Met Asp Pro Gln Gln Arg Leu  
 85 90 95

Leu Leu Glu Leu Ser Trp Glu Ala Leu Glu Asp Ala Gly Ile Arg Pro  
 100 105 110



Pro Thr Leu Ala Arg Ser Arg Thr Gly Val Phe Val Gly Ala Phe Trp  
 115 120 125

Asp Asp Tyr Thr Asp Val Leu Asn Leu Arg Ala Pro Gly Ala Val Thr  
 130 135 140

Arg His Thr Met Thr Gly Val His Arg Ser Ile Leu Ala Asn Arg Ile  
 145 150 155 160

Ser Tyr Ala Tyr His Leu Ala Gly Pro Ser Leu Thr Val Asp Thr Ala  
 165 170 175

Gln Ser Ser Ser Leu Val Ala Val His Leu Ala Cys Glu Ser Ile Arg  
 180 185 190

Ser Gly Asp Ser Asp Ile Ala Phe Ala Gly Gly Val Asn Leu Ile Cys  
 195 200 205

Ser Pro Arg Thr Thr Glu Leu Ala Ala Ala Arg Phe Gly Gly Leu Ser  
 210 215 220

Ala Ala Gly Arg Cys His Thr Phe Asp Ala Arg Ala Asp Gly Phe Val  
 225 230 235 240

Arg Gly Glu Gly Gly Gly Leu Val Val Leu Lys Pro Leu Ala Ala Ala  
 245 250 255

Arg Arg Asp Gly Asp Thr Val Tyr Cys Val Ile Arg Gly Ser Ala Val  
 260 265 270

Asn Ser Asp Gly Thr Thr Asp Gly Ile Thr Leu Pro Ser Gly Gln Ala  
 275 280 285

Gln Gln Asp Val Val Arg Leu Ala Cys Arg Arg Ala Arg Ile Thr Pro  
 290 295 300

Asp Gln Val Gln Tyr Val Glu Leu His Gly Thr Gly Thr Pro Val Gly  
 305 310 315 320

Asp Pro Ile Glu Ala Ala Ala Leu Gly Ala Ala Leu Gly Gln Asp Ala  
 325 330 335

Ala Arg Ala Val Pro Leu Ala Val Gly Ser Ala Lys Thr Asn Val Gly  
 340 345 350

His Leu Glu Ala Ala Ala Gly Ile Val Gly Leu Leu Lys Thr Ala Leu  
 355 360 365

Ser Ile His His Arg Arg Leu Ala Pro Ser Leu Asn Phe Thr Thr Pro  
 370 375 380

Asn Pro Ala Ile Pro Leu Ala Asp Leu Gly Leu Thr Val Gln Gln Asp  
 385 390 395 400

Leu Ala Asp Trp Pro Arg Pro Glu Gln Pro Leu Ile Ala Gly Val Ser  
 405 410 415

Ser Phe Gly Met Gly Gly Thr Asn Gly His Val Val Val Ala Ala Ala  
 420 425 430

Pro Asp Ser Val Ala Val Pro Glu Pro Val Gly Val Pro Glu Arg Val  
 435 440 445

Glu Val Pro Glu Pro Val Val Val Ser Glu Pro Val Val Val Pro Thr  
 450 455 460

Pro Trp Pro Val Ser Ala His Ser Ala Ser Ala Leu Arg Ala Gln Ala  
 465 470 475 480

Gly Arg Leu Arg Thr His Leu Ala Ala His Arg Pro Thr Pro Asp Ala  
 485 490 495

Ala Arg Val Gly His Ala Leu Ala Thr Thr Arg Ala Pro Leu Ala His  
 500 505 510

Arg Ala Val Leu Leu Gly Gly Asp Thr Ala Glu Leu Leu Gly Ser Leu  
 515 520 525

Asp Ala Leu Ala Glu Gly Ala Glu Thr Ala Ser Ile Val Arg Gly Glu  
 530 535 540

Ala Tyr Thr Glu Gly Arg Thr Ala Phe Leu Phe Ser Gly Gln Gly Ala  
 545 550 555 560

Gln Arg Leu Gly Met Gly Arg Glu Leu Tyr Ala Val Phe Pro Val Phe  
 565 570 575

Ala Asp Ala Leu Asp Glu Ala Phe Ala Ala Leu Asp Val His Leu Asp  
 580 585 590

Arg Pro Leu Arg Glu Ile Val Leu Gly Glu Thr Asp Ser Gly Gly Asn  
 595 600 605

Val Ser Gly Glu Asn Val Ile Gly Glu Gly Ala Asp His Gln Ala Leu  
 610 615 620

Leu Asp Gln Thr Ala Tyr Thr Gln Pro Ala Leu Phe Ala Ile Glu Thr  
 625 630 635 640

Ser Leu Tyr Arg Leu Ala Ala Ser Phe Gly Leu Lys Pro Asp Tyr Val  
 645 650 655

Leu Gly His Ser Val Gly Glu Ile Ala Ala Ala His Val Ala Gly Val  
 660 665 670

Leu Ser Leu Pro Asp Ala Ser Ala Leu Val Ala Thr Arg Gly Arg Leu  
 675 680 685

Met Gln Ala Val Arg Ala Pro Gly Ala Met Ala Ala Trp Gln Ala Thr  
 690 695 700

Ala Asp Glu Ala Ala Glu Gln Leu Ala Gly His Glu Arg His Val Thr  
 705 710 715 720

Val Ala Ala Val Asn Gly Pro Asp Ser Val Val Val Ser Gly Asp Arg  
 725 730 735

Ala Thr Val Asp Glu Leu Thr Ala Ala Trp Arg Gly Arg Gly Arg Lys  
 740 745 750

Ala His His Leu Lys Val Ser His Ala Phe His Ser Pro His Met Asp  
 755 760 765

Pro Ile Leu Asp Glu Leu Arg Ala Val Ala Ala Gly Leu Thr Phe His  
 770 775 780

Glu Pro Val Ile Pro Val Val Ser Asn Val Thr Gly Glu Leu Val Thr  
 785 790 795 800

Ala Thr Ala Thr Gly Ser Gly Ala Gly Gln Ala Asp Pro Glu Tyr Trp  
 805 810 815

Ala Arg His Ala Arg Glu Pro Val Arg Phe Leu Ser Gly Val Arg Gly  
 820 825 830

Leu Cys Glu Arg Gly Val Thr Thr Phe Val Glu Leu Gly Pro Asp Ala  
 835 840 845

Pro Leu Ser Ala Met Ala Arg Asp Cys Phe Pro Ala Pro Ala Asp Arg  
 850 855 860

Ser Arg Pro Arg Pro Ala Ala Ile Ala Thr Cys Arg Arg Gly Arg Asp  
 865 870 875 880

Glu Val Ala Thr Phe Leu Arg Ser Leu Ala Gln Ala Tyr Val Arg Gly  
 885 890 895

Ala Asp Val Asp Phe Thr Arg Ala Tyr Gly Ala Thr Ala Thr Arg Arg  
 900 905 910

Phe Pro Leu Pro Thr Tyr Pro Phe  
 915 920

&lt;210&gt; 24

&lt;211&gt; 928

&lt;212&gt; PRT

&lt;213&gt; Streptomyces antibioticus

&lt;400&gt; 24

Met His Val Pro Gly Glu Glu Asn Gly His Ser Ile Ala Ile Val Gly

1

5

10

15

Ile Ala Cys Arg Leu Pro Gly Ser Ala Thr Pro Gln Glu Phe Trp Arg

20

25

30

Leu Leu Ala Asp Ser Ala Asp Ala Leu Asp Glu Pro Pro Ala Gly Arg

35

40

45

Phe Pro Thr Gly Ser Leu Ser Ser Pro Pro Ala Pro Arg Gly Gly Phe

50

55

60

Leu Asp Ser Ile Asp Thr Phe Asp Ala Asp Phe Phe Asn Ile Ser Pro

65

70

75

80

Arg Glu Ala Gly Val Leu Asp Pro Gln Gln Arg Leu Ala Leu Glu Leu

85

90

95

Gly Trp Glu Ala Leu Glu Asp Ala Gly Ile Val Pro Arg His Leu Arg

100

105

110

Gly Thr Arg Thr Ser Val Phe Met Gly Ala Met Trp Asp Asp Tyr Ala

115

120

125

His Leu Ala His Ala Arg Gly Glu Ala Ala Leu Thr Arg His Ser Leu

130

135

140

Thr Gly Thr His Arg Gly Met Ile Ala Asn Arg Leu Ser Tyr Ala Leu

145

150

155

160

Gly Leu Gln Gly Pro Ser Leu Thr Val Asp Thr Gly Gln Ser Ser Ser

165

170

175

Leu Ala Ala Val His Met Ala Cys Glu Ser Leu Ala Arg Gly Glu Ser  
 180 185 190

Asp Leu Ala Leu Val Gly Gly Val Asn Leu Val Leu Asp Pro Ala Gly  
 195 200 205

Thr Thr Gly Val Glu Arg Phe Gly Ala Leu Ser Pro Asp Gly Arg Cys  
 210 215 220

Tyr Thr Phe Asp Ser Arg Ala Asn Gly Tyr Ala Arg Gly Glu Gly Gly  
 225 230 235 240

Val Val Val Val Leu Lys Pro Thr His Arg Ala Leu Ala Asp Gly Asp  
 245 250 255

Thr Val Tyr Cys Glu Ile Leu Gly Ser Ala Leu Asn Asn Asp Gly Ala  
 260 265 270

Thr Glu Gly Leu Thr Val Pro Ser Ala Arg Ala Gln Ala Asp Val Leu  
 275 280 285

Arg Gln Ala Trp Glu Arg Ala Arg Val Ala Pro Thr Asp Val Gln Tyr  
 290 295 300

Val Glu Leu His Gly Thr Gly Thr Pro Ala Gly Asp Pro Val Glu Ala  
 305 310 315 320

Glu Gly Leu Gly Thr Ala Leu Gly Thr Ala Arg Pro Ala Glu Ala Pro  
 325 330 335

Leu Leu Val Gly Ser Val Lys Thr Asn Ile Gly His Leu Glu Gly Ala  
 340 345 350

Ala Gly Ile Ala Gly Leu Leu Lys Thr Val Leu Ser Ile Lys Asn Arg  
 355 360 365

His Leu Pro Ala Ser Leu Asn Phe Thr Ser Pro Asn Pro Arg Ile Asp  
 370 375 380

Leu Asp Ala Leu Arg Leu Arg Val His Thr Ala Tyr Gly Pro Trp Pro  
 385 390 395 400

Ser Pro Asp Arg Pro Leu Val Ala Gly Val Ser Ser Phe Gly Met Gly  
 405 410 415

Gly Thr Asn Cys His Val Val Leu Ser Glu Leu Arg Asn Ala Gly Gly  
 420 425 430

Asp Gly Ala Gly Lys Gly Pro Tyr Thr Gly Thr Glu Asp Arg Leu Gly  
 435 440 445

Ala Thr Glu Ala Glu Lys Arg Pro Asp Pro Ala Thr Gly Asn Gly Pro  
 450 455 460

Asp Pro Ala Gln Asp Thr His Arg Tyr Pro Ala Leu Ile Leu Ser Ala  
 465 470 475 480

Arg Ser Asp Ala Ala Leu Arg Ala Gln Ala Glu Arg Leu Arg His His  
 485 490 495

Leu Glu His Ser Pro Gly Gln Arg Leu Arg Asp Thr Ala Tyr Ser Leu  
 500 505 510

Ala Thr Arg Arg Gln Val Phe Glu Arg His Ala Val Val Thr Gly His  
 515 520 525

Asp Arg Glu Asp Leu Leu Asn Gly Leu Arg Asp Leu Glu Asn Gly Leu  
 530 535 540

Pro Ala Pro Gln Val Leu Leu Gly Arg Thr Pro Thr Pro Glu Pro Gly  
 545 550 555 560

Gly Leu Ala Phe Leu Phe Ser Gly Gln Gly Ser Gln Gln Pro Gly Met  
 565 570 575

Gly Lys Arg Leu His Gln Val Phe Pro Gly Phe Arg Asp Ala Leu Asp  
 580 585 590

Glu Val Cys Ala Glu Leu Asp Thr His Leu Gly Arg Leu Leu Gly Pro  
 595 600 605

Glu Ala Gly Pro Pro Leu Arg Asp Val Met Phe Ala Glu Arg Gly Thr  
 610 615 620

Ala His Ser Ala Leu Leu Ser Glu Thr His Tyr Thr Gln Ala Ala Leu  
 625 630 635 640

Phe Ala Leu Glu Thr Ala Leu Phe Arg Leu Leu Val Gln Trp Gly Leu  
 645 650 655

Lys Pro Asp His Leu Ala Gly His Ser Val Gly Glu Ile Ala Ala Ala  
 660 665 670

His Ala Ala Gly Ile Leu Asp Leu Ser Asp Ala Ala Glu Leu Val Ala  
 675 680 685

Thr Arg Gly Ala Leu Met Arg Ser Leu Pro Gly Gly Gly Val Met Leu  
 690 695 700

Ser Val Gln Ala Pro Glu Ser Glu Val Ala Pro Leu Leu Leu Gly Arg  
 705 710 715 720

Glu Ala His Val Gly Leu Ala Ala Val Asn Gly Pro Asp Ala Val Val  
 725 730 735

Val Ser Gly Glu Arg Gly His Val Ala Ala Ile Glu Gln Ile Leu Arg  
 740 745 750

Asp Arg Gly Arg Lys Ser Arg Tyr Leu Arg Val Ser His Ala Phe His  
 755 760 765

Ser Pro Leu Met Glu Pro Val Leu Glu Glu Phe Ala Glu Ala Val Ala  
 770 775 780

Gly Leu Thr Phe Arg Ala Pro Thr Thr Pro Leu Val Ser Asn Leu Thr  
 785 790 795 800



Gly Ala Pro Val Asp Asp Arg Thr Met Ala Thr Pro Ala Tyr Trp Val  
                   805                  810                  815

Arg His Val Arg Glu Ala Val Arg Phe Gly Asp Gly Ile Arg Ala Leu  
                   820                  825                  830

Gly Lys Leu Gly Thr Gly Ser Phe Leu Glu Val Gly Pro Asp Gly Val  
                   835                  840                  845

Leu Thr Ala Met Ala Arg Ala Cys Val Thr Ala Ala Pro Glu Pro Gly  
                   850                  855                  860

His Arg Gly Glu Gln Gly Ala Asp Ala Asp Ala His Thr Ala Leu Leu  
                   865                  870                  875                  880

Leu Pro Ala Leu Arg Arg Gly Arg Asp Glu Ala Arg Ser Leu Thr Glu  
                   885                  890                  895

Ala Val Ala Arg Leu His Leu His Gly Val Pro Met Asp Trp Thr Ser  
                   900                  905                  910

Val Leu Gly Gly Asp Val Ser Arg Val Pro Leu Pro Thr Tyr Ala Phe  
                   915                  920                  925

<210> 25

<211> 922

<212> PRT

<213> Streptomyces fradiae

<400> 25

Met Ser Ser Ala Leu Arg Arg Ala Val Gln Ser Asn Cys Gly Tyr Gly  
       1                  5                  10                  15

Asp Leu Met Thr Ser Asn Thr Ala Ala Gln Asn Thr Gly Asp Gln Glu  
 20 25 30

Asp Val Asp Gly Pro Asp Ser Thr His Gly Gly Glu Ile Ala Val Val  
 35 40 45

Gly Met Ser Cys Arg Leu Pro Gly Ala Ala Gly Val Glu Glu Phe Trp  
 50 55 60

Glu Leu Leu Arg Ser Gly Arg Gly Met Pro Thr Arg Gln Asp Asp Gly  
 65 70 75 80

Thr Trp Arg Ala Ala Leu Glu Asp His Ala Gly Phe Asp Ala Gly Phe  
 85 90 95

Phe Gly Met Asn Ala Arg Gln Ala Ala Ala Thr Asp Pro Gln His Arg  
 100 105 110

Leu Met Leu Glu Leu Gly Trp Glu Ala Leu Glu Asp Ala Gly Ile Val  
 115 120 125

Pro Gly Asp Leu Thr Gly Thr Asp Thr Gly Val Phe Ala Gly Val Ala  
 130 135 140

Ser Asp Asp Tyr Ala Val Leu Thr Arg Arg Ser Ala Val Ser Ala Gly  
 145 150 155 160

Gly Tyr Thr Ala Thr Gly Leu His Arg Ala Leu Ala Ala Asn Arg Leu  
 165 170 175

Ser His Phe Leu Gly Leu Arg Gly Pro Ser Leu Val Val Asp Ser Ala  
 180 185 190

Gln Ser Ala Ser Leu Val Ala Val Gln Leu Ala Cys Glu Ser Leu Arg  
 195 200 205

Arg Gly Glu Thr Ser Leu Ala Val Ala Gly Gly Val Asn Leu Ile Leu  
 210 215 220

Thr Glu Glu Ser Thr Thr Val Met Glu Arg Met Gly Ala Leu Ser Pro  
 225 230 235 240

Asp Gly Arg Cys His Thr Phe Asp Ala Arg Ala Asn Gly Tyr Val Arg  
 245 250 255

Gly Glu Gly Gly Gly Ala Val Val Leu Lys Pro Leu Asp Ala Ala Leu  
 260 265 270

Ala Asp Gly Asp Arg Val Tyr Cys Val Ile Lys Gly Gly Ala Val Asn  
 275 280 285

Asn Asp Gly Gly Gly Ala Ser Leu Thr Thr Pro Asp Arg Glu Ala Gln  
 290 295 300

Glu Ala Val Leu Arg Gln Ala Tyr Arg Arg Ala Gly Val Ser Thr Gly  
 305 310 315 320

Ala Val Arg Tyr Val Glu Leu His Gly Thr Gly Thr Arg Ala Gly Asp  
 325 330 335

Pro Val Glu Ala Ala Ala Leu Gly Ala Val Leu Gly Ala Gly Ala Asp  
 340 345 350

Ser Gly Arg Ser Thr Pro Leu Ala Val Gly Ser Val Lys Thr Asn Val  
 355 360 365

Gly His Leu Glu Gly Ala Ala Gly Ile Val Gly Leu Ile Lys Ala Thr  
 370 375 380

Leu Cys Val Arg Lys Gly Glu Leu Val Pro Ser Leu Asn Phe Ser Thr  
 385 390 395 400

Pro Asn Pro Asp Ile Pro Leu Asp Asp Leu Arg Leu Arg Val Gln Thr  
 405 410 415

Glu Arg Gln Glu Trp Asn Glu Glu Asp Asp Arg Pro Arg Val Ala Gly  
 420 425 430

Val Ser Ser Phe Gly Met Gly Gly Thr Asn Val His Leu Val Ile Ala  
435 440 445

Glu Ala Pro Ala Ala Ala Gly Ser Ser Gly Ala Gly Gly Ser Gly Ala  
450 455 460

Gly Ser Gly Ala Gly Ile Ser Ala Val Ser Gly Val Val Pro Val Val  
465 470 475 480

Val Ser Gly Arg Ser Arg Val Val Val Arg Glu Ala Ala Gly Arg Leu  
485 490 495

Ala Glu Val Val Glu Ala Gly Gly Val Gly Leu Ala Asp Val Ala Val  
500 505 510

Thr Met Ala Asp Arg Ser Arg Phe Gly Tyr Arg Ala Val Val Leu Ala  
515 520 525

Arg Gly Glu Ala Glu Leu Ala Gly Arg Leu Arg Ala Leu Ala Gly Gly  
530 535 540

Asp Pro Asp Ala Gly Val Val Thr Gly Ala Val Leu Asp Gly Gly Val  
545 550 555 560

Val Val Gly Ala Ala Pro Gly Gly Ala Gly Ala Ala Gly Gly Ala Gly  
565 570 575

Ala Ala Gly Gly Ala Gly Gly Gly Gly Val Val Leu Val Phe Pro Gly  
580 585 590

Gln Gly Thr Gln Trp Val Gly Met Gly Ala Gly Leu Leu Gly Ser Ser  
595 600 605

Glu Val Phe Ala Ala Ser Met Arg Glu Cys Ala Arg Ala Leu Ser Val  
610 615 620

His Val Gly Trp Asp Leu Leu Glu Val Val Ser Gly Gly Ala Gly Leu  
625 630 635 640

Glu Arg Val Asp Val Val Gln Pro Val Thr Trp Ala Val Met Val Ser  
 645 650 655

Leu Ala Arg Tyr Trp Gln Ala Met Gly Val Asp Val Ala Ala Val Val  
 660 665 670

Gly His Ser Gln Gly Glu Ile Ala Ala Ala Thr Val Ala Gly Ala Leu  
 675 680 685

Ser Leu Glu Asp Ala Ala Ala Val Val Ala Leu Arg Ala Gly Leu Ile  
 690 695 700

Gly Arg Tyr Leu Ala Gly Arg Gly Ala Met Ala Ala Val Pro Leu Pro  
 705 710 715 720

Ala Gly Glu Val Glu Ala Gly Leu Ala Lys Trp Pro Gly Val Glu Val  
 725 730 735

Ala Ala Val Asn Gly Pro Ala Ser Thr Val Val Ser Gly Asp Arg Arg  
 740 745 750

Ala Val Ala Gly Tyr Val Ala Val Cys Gln Ala Glu Gly Val Gln Ala  
 755 760 765

Arg Leu Ile Pro Val Asp Tyr Ala Ser His Ser Arg His Val Glu Asp  
 770 775 780

Leu Lys Gly Glu Leu Glu Arg Val Leu Ser Gly Ile Arg Pro Arg Ser  
 785 790 795 800

Pro Arg Val Pro Val Cys Ser Thr Val Ala Gly Glu Gln Pro Gly Glu  
 805 810 815

Pro Val Phe Asp Ala Gly Tyr Trp Phe Arg Asn Leu Arg Asn Arg Val  
 820 825 830

Glu Phe Ser Ala Val Val Gly Gly Leu Leu Glu Glu Gly His Arg Arg  
 835 840 845

Phe Ile Glu Val Ser Ala His Pro Val Leu Val His Ala Ile Glu Gln  
 850 855 860

Thr Ala Glu Ala Ala Asp Arg Ser Val His Ala Thr Gly Thr Leu Arg  
 865 870 875 880

Arg Gln Asp Asp Ser Pro His Arg Leu Leu Thr Ser Thr Ala Glu Ala  
 885 890 895

Trp Ala His Gly Ala Thr Leu Thr Trp Asp Pro Ala Leu Pro Pro Gly  
 900 905 910

His Leu Thr Thr Leu Pro Thr Tyr Pro Phe  
 915 920

<210> 26

<211> 122

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:

Oligonucleotide

<400> 26

ctaggccggg ccggactggt agatctgcct acgtatcctt tccagggcaa gcggttctgg 60  
 ctgcagccgg accgcactag tcctcgtgac gagggagatg catcgagcct gagggaccgg 120  
 tt 122

<210> 27  
 <211> 118  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:  
 Oligonucleotide

<400> 27  
 aaccggtccc tcaggctcga tgcattctccc tcgtcacgag gactagtgcg gtccggctgc 60  
 agccagaacc gcttgccctg gaaaggatac gtaggcagat ctaccagtcg ggcccggc 118

<210> 28  
 <211> 26  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:  
 Oligonucleotide

<400> 28  
 ccatatggcc gcatccgcgt cagcgt 26

<210> 29  
 <211> 31  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:  
 Oligonucleotide

<400> 29  
 ggctagcggg tcctcgtccg tgccgaggtc a 31

<210> 30  
<211> 48  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 30  
aattcacatc accatcacca tcactagtag gaggtctggc catctaga 48

<210> 31  
<211> 48  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 31  
agcttctaga tggccagacc tcctactagt gatggtgatg gtgatgtg 48

<210> 32  
<211> 39  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 32  
tggaccgccg ccaattgcct aggcgggccg aaccggct 39



<210> 33  
<211> 36  
<212> DNA  
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 33  
cctgcaggcc atcgcgacga ccgcgaccgg ttcgcc

36

<210> 34  
<211> 27  
<212> DNA  
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 34  
ccacatatgc atgtccccgg cgaggaa

27

<210> 35  
<211> 30  
<212> DNA  
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 35  
ccctgtccgg agaagaggaa ggcgaggccg

30

<210> 36

<211> 34

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:

Oligonucleotide

<400> 36

ccatatgtct ggagaactcg cgatttcccg cagt

34

<210> 37

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:

Oligonucleotide

<400> 37

ggctagcggg tcgtcgtcgt cccggctg

28

<210> 38

<211> 37

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:

Oligonucleotide

<400> 38

tacctaggcc gggccggact ggtcgacctg ccgggtt

37

<210> 39

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 39

atgttaaccg gtcgcgcagg ctctccgtct

30

<210> 40

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 40

atgttaacgg gtctgccgcg tgccgagcgg ac

32

<210> 41

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 41

cttctagact atgaattccc tccgcccagc

30

<210> 42

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 42

taagatcttc cgacgtacgc gttccagc

28

<210> 43

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 43

atgctagcca ctgcgccgac gaatcaccgg tgg

33

<210> 44

<211> 34

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 44

tacctgaggg accggctagc gggctctgccg cgtg

34

<210> 45

<211> 34

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 45

atgctagccg ttgtgccggc tcgccggtcg gtcc

34

<210> 46

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 46

cgttcctgag gtcgctggcc caggcgta

28

<210> 47

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 47

cgaagcttga caccgcggcg cggcgcg

28

<210> 48

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

<400> 48

gcgcgccaat tgcgtgcaca tctcgat

27

<210> 49

<211> 37

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:  
Oligonucleotide

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37

<210> 50

<211> 29

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence:  
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29

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Oligonucleotide

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28

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34

<210> 54

<211> 30

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence:

Oligonucleotide

<400> 54

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30

<210> 55

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

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<400> 55

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32